TO ALL COMMCARE CENTRES

This Commcare update is the first of a new standard designed to inform Commcare Centres about product repair, new products, procedural changes, etc. They include:

Schematic Diagrams

Operating Procedure Updates

Service Tips

Reference materials for technicians, eg, reference books

Tech Topics which will include:

    Technical Service Bulletins
    Diagnostic Software Information

New Products Information

Available service manuals

Available diagnostics

Commcare reminders

Commodores' Service Department would appreciate constructive and sound feedback about this update in particular, so that we can provide you with the information you need. If we receive insufficient feedback then we cannot support you in this way. It is up to you.

RECEIVED
01 JUL 1988

COMMCARE UPDATE - MAY 1988

CONTENTS

1. Procedural Update
2. Available Products
3. Schematic Diagrams
4. PC10 RS232 Interface Connections
5. PC Repair Tips
6. Amiga 2088 Bridgeboard Users Guide
7. New products
8. Service Manual List
9. Sample Technical Service Bulletin

1.0 PROCEDURAL UPDATE

The attached procedural update contains three bulletins which relate directly to the AUTHORISED COMMODORE COMMCARE SERVICE CENTRE WARRANTY OPERATING These updates are intended to assist Commcare Centres with the processing, administration and repair of Commodore products under warranty.

In the event of loss of any update or if your update is incomplete, contact the Commodore Service Department immediately and arrangements will be made to have another copy sent to you.

This update contains three (3) procedural updates. They are:

1.	Update No. 1	Return of sub-assemblies for warranty repair (1 page).
2.	Update No. 2	Return of Parts and Equipment (2 pages).
3.	Update No. 3	Education Department Warranties (3 pages).

COMMCARE PROCEDURAL UPDATE NO. 1

It is recommended that this document be kept attached to Appendix A of your copy of the Commodore Warranty Operating Procedure Manual for safe keeping and reference purposes.

SUBJECT

Return of sub-assemblies from a Commodore Dealer or other person to a Commcare Centre for warranty repair.

REFERENCE

AUTHORISED COMMODORE COMMCARE SERVICE MANUAL
WARRANTY OPERATING PROCEDURE MANUAL

Page 5.

COMMODORE/COMMCARE WARRANTY SERVICE PROCEDURE.

EXPLANATION

The terms "unit" and "goods" mean a complete Commodore computer or peripheral device.

This means that a Dealer or other person cannot return a sub-assembly, such as a hard drive and/or PC power supply for warranty repair. The customer must return the whole computer or peripheral device to claim warranty repair. Commodore will not pay any warranty claims for modular repairs unless by prior arrangement with Commodore.

EXCEPTIONS

None

Authorised by:

Bob Lane

Commodore Business Machines Pty Ltd
28 April 1988

COMMCARE PROCEDURAL UPDATE NO. 2

It is recommended that this document be kept attached to Appendix A of your copy of the Commodore Warranty Operating Procedure Manual for safe keeping and reference purposes.

SUBJECT

Return of parts and equipment from Commcare Centres.

REFERENCE

AUTHORISED COMMODORE COMMCARE SERVICE MANUAL
WARRANTY OPERATING PROCEDURE MANUAL

Page 13.

ORDERING OF REPLACEMENT PARTS

EXPLANATION

The procedures have changed such as to improve the conveyance of replacement parts and machines to Commodore. This should eliminate the confusion that has arisen concerning the return of parts and machines from Commcare centres, either for warranty replacement or by agreement with Commodore.

The last paragraph on Page 13 must be deleted. This paragraph begins with the words "In the event of complete unit replacement, the"...

Place the note "See COMMCARE PROCEDURAL UPDATE NO. 2" alongside the deletion.

EXCEPTIONS

None

INCLUSIONS

Warranty replacement parts

The Commcare Centre will place "Warranty Claims Parts" labels on the outside of cartons containing warranty replacement parts and warranty claim forms. A Commodore approved courier will accept the parcel and transport it to Commodore for processing.

Machines returned for replacement

The Commcare Centre will contact the National Operations Manager or the National Service Manager and gain approval for item return or replacement. The Commcare Centre must supply the following information.

1. Details of Commcare Centre making request.
2. Full description of goods.
3. Commcare Centre credit claim number.
4. Commcare Centre order number.

Commodore will raise a credit against the Commcare Centres' chargeable account quoting the supplied claim number. A replacement order will be processed against the same account quoting the new order number.

Authorised by:

Bob Lane

Bob Lane

Commodore Business Machines Pty Ltd
27 April 1988

COMMCARE PROCEDURAL UPDATE NO. 3

It is recommended that this document be kept attached to Appendix A of your copy of the Commodore Warranty Operating Procedure Manual for safe keeping and reference purposes.

SUBJECT

Education Department Product Warranties.

REFERENCE

AUTHORISED COMMODORE COMMCARE SERVICE MANUAL
WARRANTY OPERATING PROCEDURE MANUAL

Page 3.

TERMS OF WARRANTY

EXPLANATION

The Operating Manual does not include Education Department Product Warranties. This procedural update is to inform authorised Commodore Commcare Centres that special warranty conditions apply to Commodore products sold to the Education Department. These warranty conditions apply to all states and territories of Australia.

Place the note **See** COMMCARE PROCEDURAL UPDATE NO. 3 **Education Department Warranties** alongside the title TERMS OF WARRANTY.

EXCEPTIONS

None

INCLUSIONS

Education Department Warranties

Unless otherwise stated and subject to the terms listed in the following sub-sections, all Commodore 6502 micrprocessor products products sold to Education Departments in all states and territories of Australia carry a six (6) months warranty. All Commodore PC and Amiga products sold to Education Departments in all states and territories of Australia carry a twelve (12) months warranty.

This warranty covers the cost of all parts, labour, and freight only to and from a Commcare Centre to the Dealer.

COMMCARE PROCEDURAL UPDATE NO. 4

It is recommended that this document be kept attached to Appendix A of your copy of the Commodore Warranty Operating Procedure Manual for safe keeping and reference purposes.

SUBJECT

Replacement of non repairable products.

REFERENCE

AUTHORISED COMMODORE COMMCARE SERVICE MANUAL
WARRANTY OPERATING PROCEDURE MANUAL

Page 13.

REPLACEMENT PARTS AND DOCUMENTATION

and

COMMCARE PROCEDURAL UPDATE NO. 2

EXPLANATION

This new procedure has been included to cover instances when a product item such as a computer, monitor, printer, disk drive or other major item cannot be repaired by a Commcare Centre.

EXCEPTIONS

None

INCLUSIONS

The heading **Machines returned for replacement** and its contents given in Commcare Procedural Update No. 2 must be deleted and the note "See Commcare Procedural Update No. 4" be included alongside the deletion. Delete the words "and machines" from the the third line of text under the heading **EXPLANATION** in the same update.

The heading **Equipment Replacement Procedure** must be included on Page 14 of the manual immediately above the heading **SOFTWARE WARRANTY PROCEDURES** with the reference:

See Commcare Procedural Update No. 4.

The procedure is described as follows:

Equipment Replacement Procedure

As we are all aware, instances arise when a hardware product cannot be repaired. This may be due to a faulty printed wiring board or abnormally high component failure determined before component replacement (eg, faulty RAM, ROM combination). In these instances, we now require that you complete the attached Product Replacement Report and return it directly to Commodores' Service Department either by facsimile or post.

This document, and our inspection of the faulty product will determine its replacement or repair at our discretion. If, in our opinion, the product can be repaired economically within a reasonable time period, your claim for services to that particular item will be denied. It is therefore most important to complete the requirements of the Product Replacement Report.

The procedure for item replacement is as follows:

1. Complete the Product Replacement Report fully only when a product cannot be repaired. Make sure that customers' proof of purchase and your technical report is attached to the Product Replacement Report. Send the complete report by post to:

   Commodore Service Department
   67 Mars Road
   (Private Bag 7)
   Lane Cove NSW 2066

   In urgent cases, send the report via facsimile. Our facsimile number is (02) 428-3607.

2. Commodore will contact the Commcare Centre when it has been determined that the product is replaceable and an R number will be issued.

4. The product will be replaced upon receipt at Commodore.

5. Commodore will raise a credit note to the Commcare Centres' chargeable account for the return of the defective item.

6. An invoice will then be raised to the chargeable account for the replacement item. This will offset the credit note.

Note that in the event of determination that the contents of the Product Replacement Report were incorrect or falsely stated in respect to the product returned, and product replacement was granted, the Commcare Centre will be debited the value of the replacement item less the current market value of the item returned.

This procedure is now required so that Commodore receive feedback from Commcare Centres so that we may monitor our quality control and servicing procedures in the interests of our end-users.

Authorised by:

Bob Lane
Hardware Manager
Commodore Business Machines
9th June 1988

PRODUCT REPLACEMENT REPORT

1. Product Description (eg, C64): ____________________

2. Dealers' Name: ____________________

3. Dealers' Address: ____________________

____

____

4. Dealers' 'Phone: __________ Dealers' Repair No. __________

5. Contact Name: ____________________

6. Owners' Name: ____________________

7. Owners' Address: ____________________

____

____

8. Owners' 'Phone: __________

9. Receiving RA No. __________ Date Received: __________

10. Service Report No. __________ Date Commenced: __________

11. Has sender/owner been informed of repair status? (Y or N) ______

12. Name of repair person seeking replacement: ____________________

13. Total time spent on repair in hours (eg, 10.7): ____________________

14. List of all parts used in attempt to repair product:

____

____

____

15. Is the fault visual (eg, cracked circuit board)? Please state.

____

____

16. Technical report. Attach a reasonably detailed report written in a narrative style detailing what tests/diagnostic procedures were followed in determining that the item was not repairable. This report must justify for reason for item replacement.

Signed: ____________________ (Manager)

Date: _____ / _____ /_____

Commcare Centre: ____________________

CBM approval by: ____________________ Date: _____ / _____ /_____

General Conditions

The following general conditions apply to the product warranty.

1. Faulty products must be returned to one of two places:

   i. The Commodore Dealer from whom the product was purchased. In this instance, the Dealer will be responsible for validating the warranty claim, and where necessary, arrange forwarding of the product to the nearest Commcare Centre.

   ii. A Commcare Centre. The Commcare Centre will also be responsible for validating the warranty claim, and effecting repair of the faulty product.

   NOTE: It will be necessary for the customer to provide proof of purchase within the warranty period.

2. The customer is responsible for the cost of transporting the product for warranty repairs to an authorised Commodore Dealer or Commcare Centre.

3. Warranty on Commodore products only covers those products purchased in Australia. Commodore will not reimburse warranty repair costs on products purchased overseas.

4. Commodore may furnish fully re-worked parts that are covered under new part warranty.

Exclusions

The warranty on Commodore products will be null and void if:

1. It has been determined that the equipment has been operated in a manner other than that mentioned in the User Manual accompanying the equipment. This includes the attachment of non-Commodore approved peripherals including power supplies.

2. The damage or defect, in respect of which the claim is made has occurred in transit or is due to any mishandling and/or accident as is other than that which would result from normal usage.

3. Alteration to any circuit or circuitry which has been made by persons other than Commodore certified service personnel, in such a manner that the product no longer complies with the original design.

   The above will apply to third party ROM changes during the warranty period.

4. The serial number of the product has been defaced, removed or replaced.

5. If the damage has resulted from normal wear and tear.

6. Damages resulting from accident, abuse, or natural disaster.

Limitations

Commodore will not, except as expressly provided herein, be liable to any form of damage whether direct, indirect, incidental or otherwise arising out of or in connection with the use of the product.

The liability of Commodore shall be limited to one or more of the following as Commodore in its absolute discretion shall decide:

1. Replacement of the product or part thereof.
2. Supply of equivalent product.
3. Repair of the product or part thereof.
4. The payment of the cost of replacing the product or of acquiring equivalent product.
5. The payment of the cost of having the equipment repaired.

NOTE: The terms and conditions of the warranty will be adhered to by the Commcare Centre.

Failure to do so can result in non-payment of warranty repair costs.

Authorised by:

Bob Lane

Bob Lane

Commodore Business Machines Pty Ltd
12 May 1988

BY COMMODORE®
AMIGA™

20 May 1988

Dear Commcare,

By now you should have received your warranty claim freight stickers. Please ensure that all your warranty parts returns display one of these stickers on each carton. Effective 1-6-88 any cartons not displaying these stickers may be returned to you by Multigroup.

Regards,

Brian Briton
Commcare Co-ordinator

commodore

Commodore Business Machines Pty. Ltd.
(Incorporated in NSW)
67 Mars Road, (Private Bag 7, Lane Cove)
Lane Cove, N.S.W. 2066. Australia
Telephone: (02) 4274888. Telex: 71375 Comdre. Facsimile: 4283607

2.0 AVAILABLE PRODUCTS

2.1 1571/C128D Diagnostic Manual

Diagnostic manual PN-314855-03 was developed to aid service staff in the use of the diagnostics available for Repair Troubleshooting of the CBM C128/128D Consumer Product Line. The manual includes a diagnostic disk PN-314855-01.

Cost of this diagnostic is $16.00.

When ordering please quote Manual PN-314855-03, Part No. 913539.

2.2 1541/1541 II Disk Drive Service Manual

This manual includes specifications, major parts list, board layout, component parts list and 1541 II schematic diagram.

Cost of this manual is $10.00.

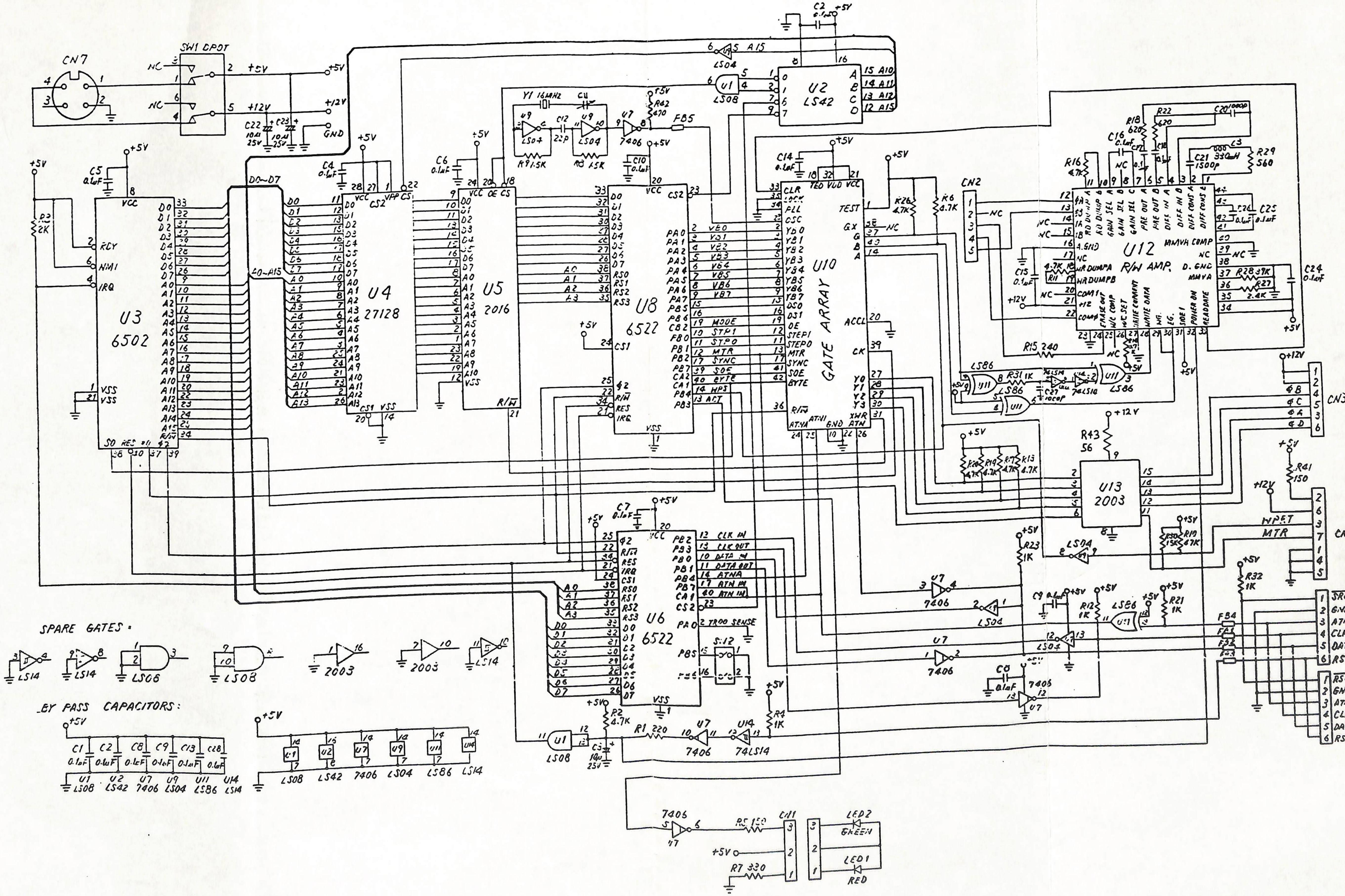
When ordering please quote Manual PN-314862-01, Part No. 913536.

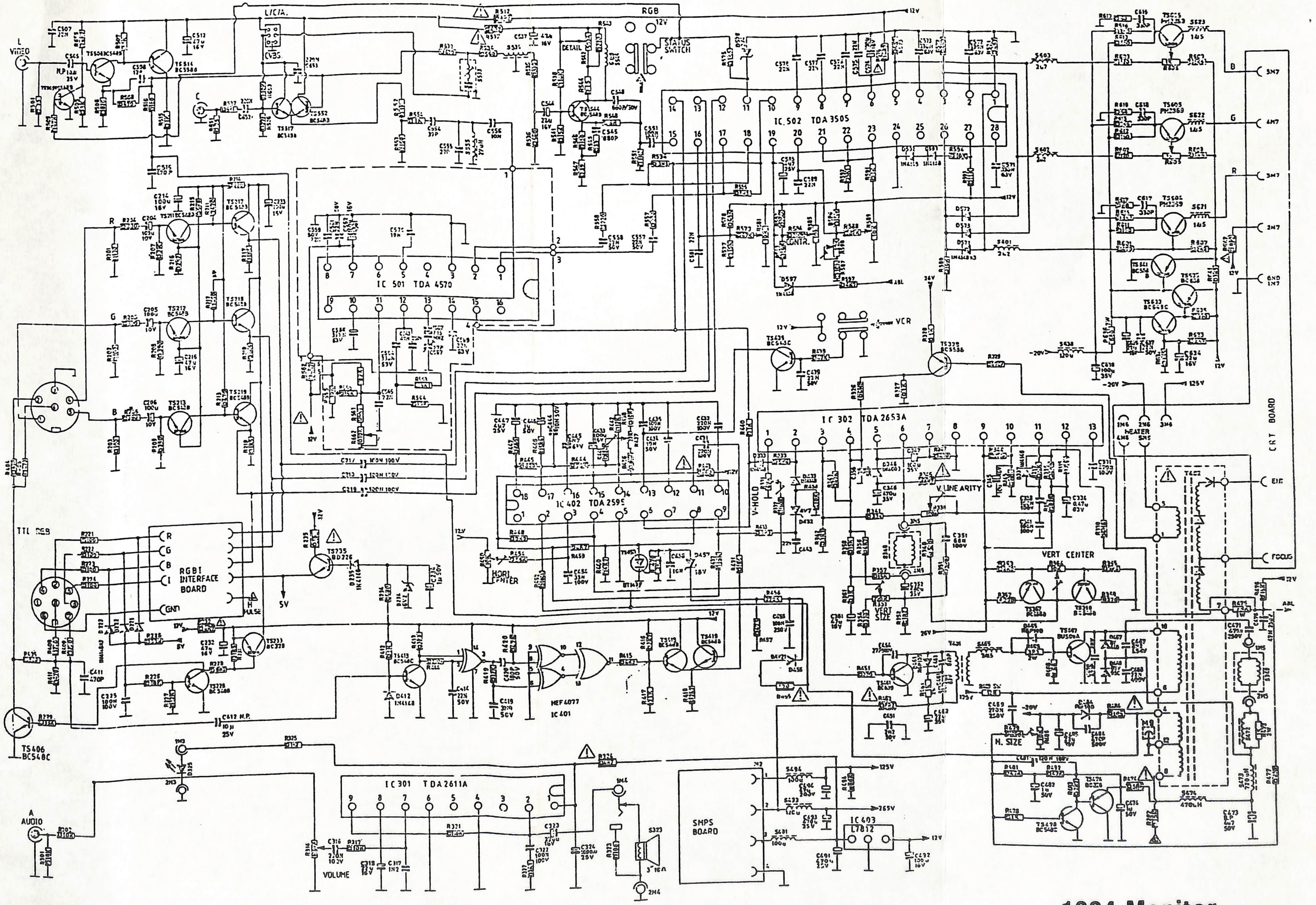
3.0 SCHEMATIC DIAGRAMS

The schematic diagrams below are attached for your information.

1. 1541/1541 II Schematic Diagram
2. 1084 Monitor Schematic Diagram
3. PC10 Power Supply Schematic Diagram
4. A500 Main Board "Rock Lobster"
5. 1571CR Disk Drive
6. C-64 BN/E Schematic Diagram
7. PC10-III Schematic Diagram
8. A2000CR Schematic Diagram

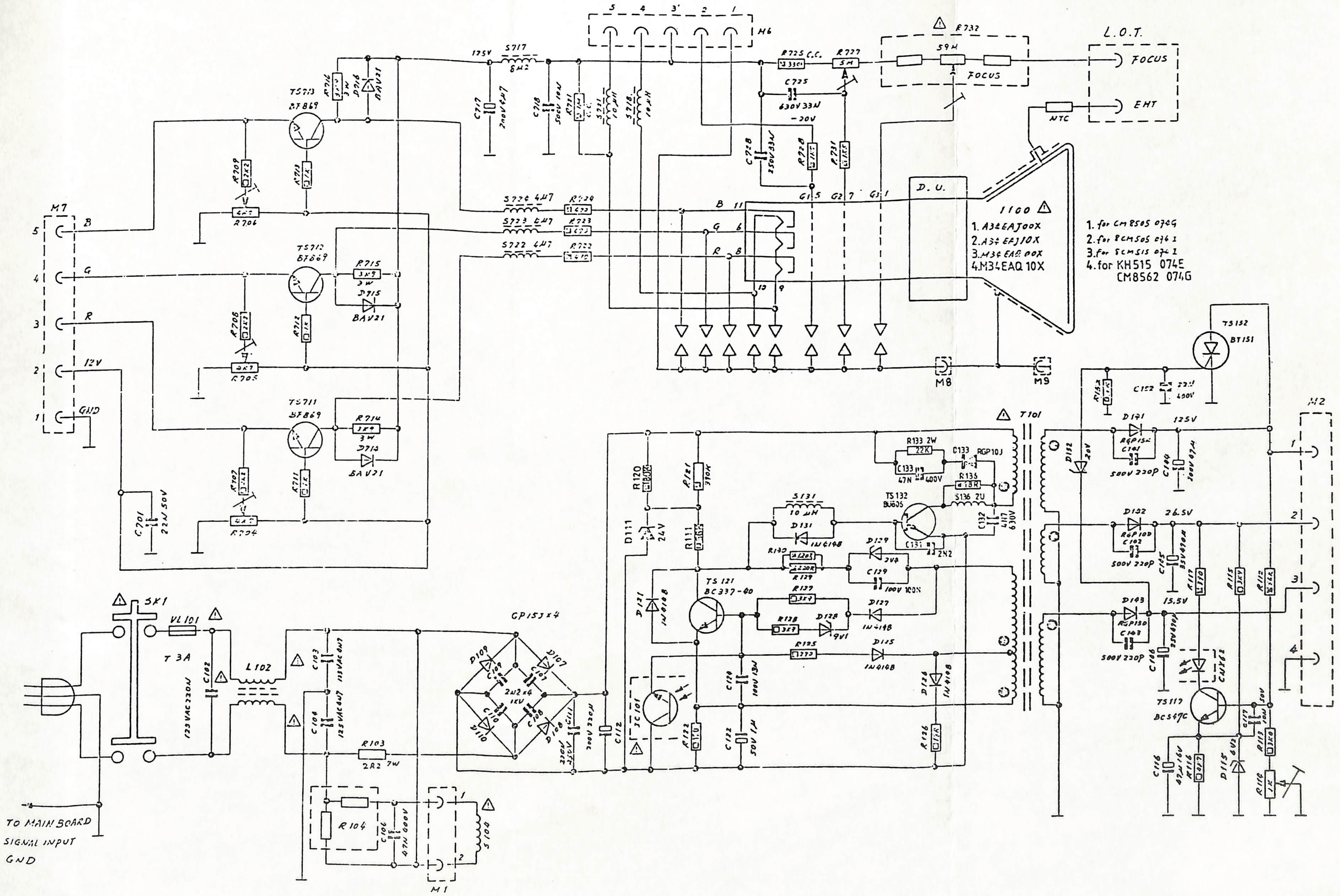
1541-II Schematic #355207





FOR REFERENCE ONLY

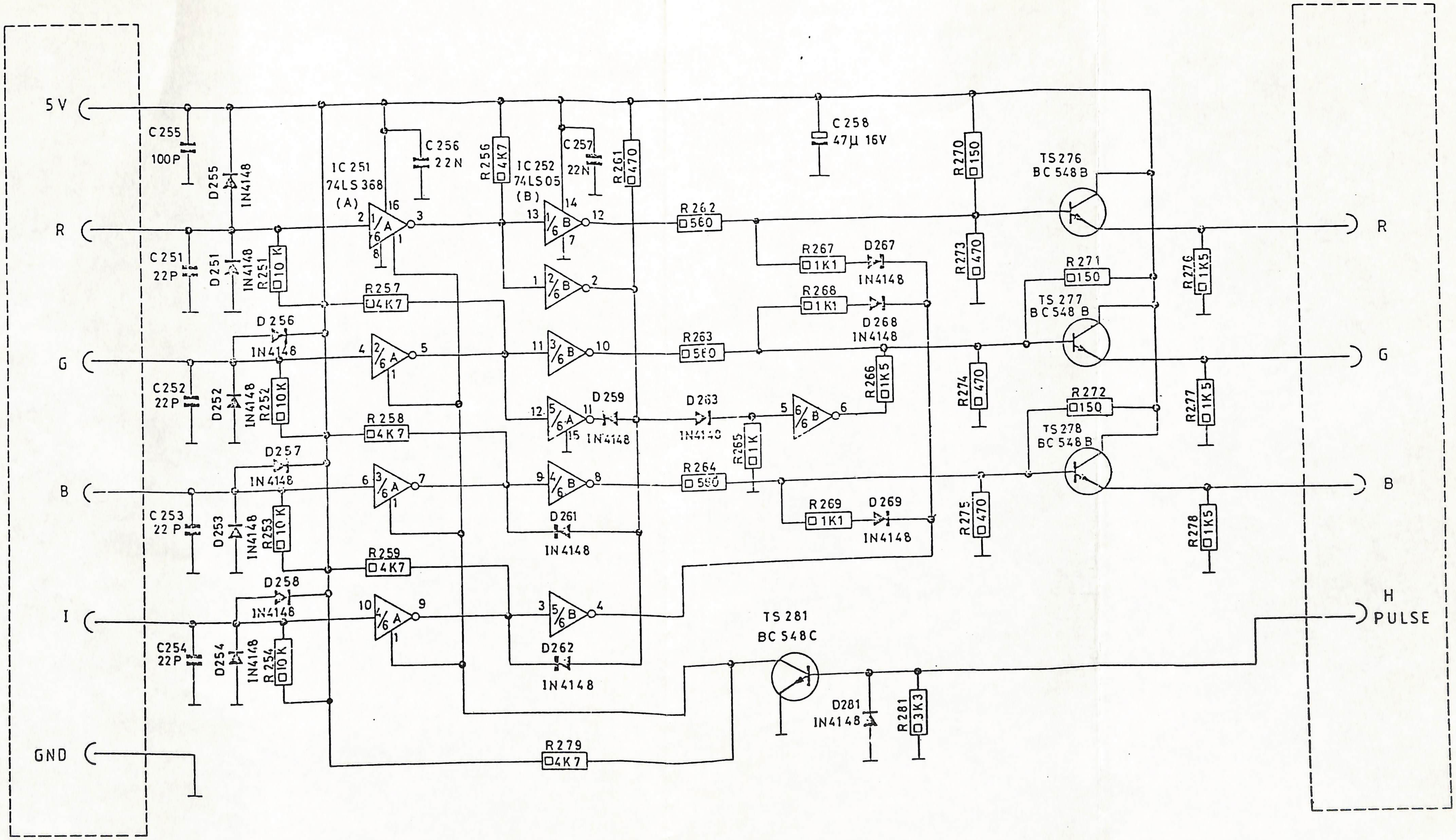
1084 Monitor
OEM — Philips Schematics
Sheet 1 of 3



FOR REFERENCE ONLY

1084 Monitor
OEM — Philips Schematics

Sheet 2 of 3



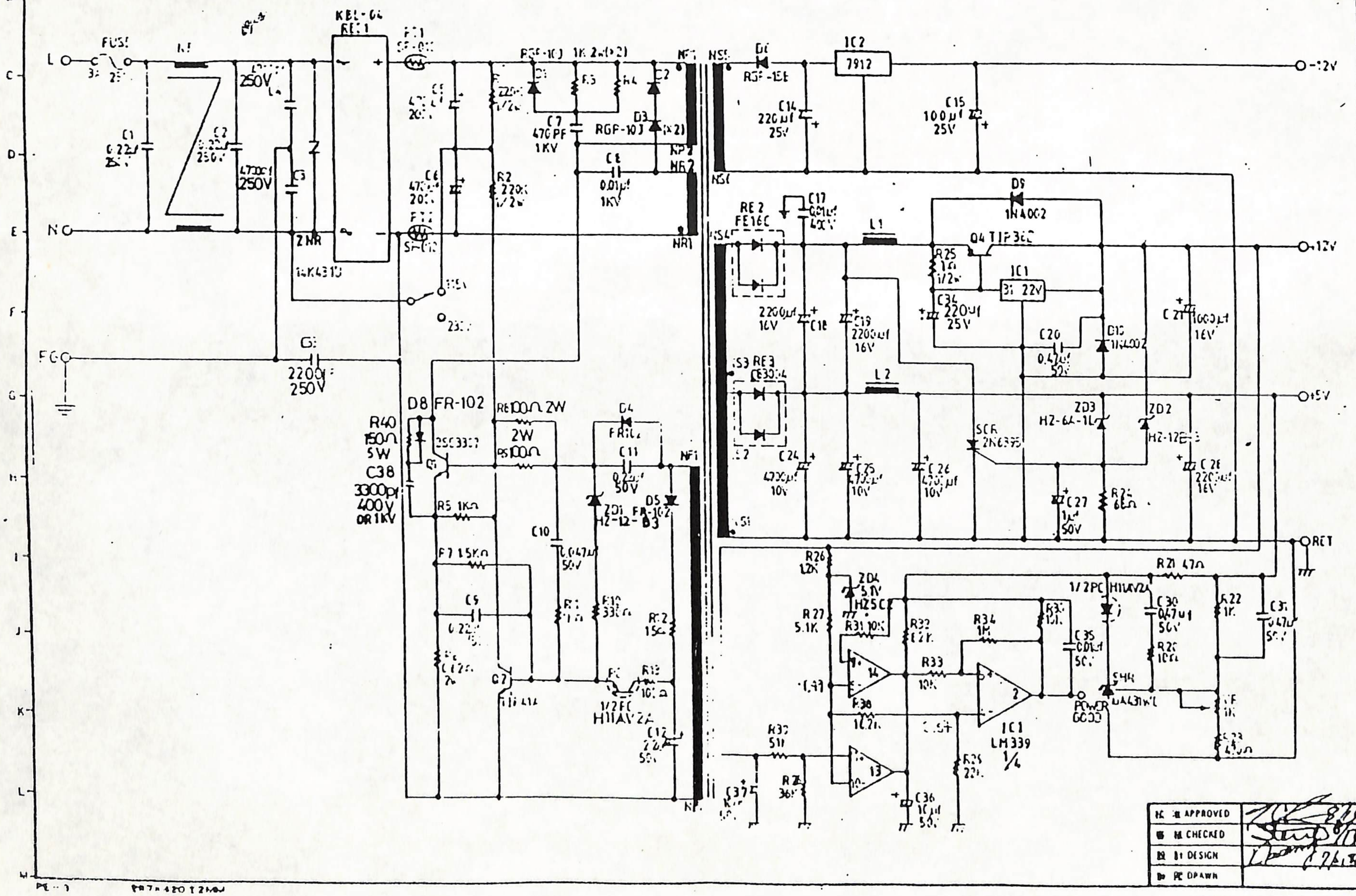
FOR REFERENCE ONLY

1084 Monitor
OEM — Philips Schematics
Sheet 3 of 3

PC10 P/S PH1-1

REVISIONS

A	[illegible] 400V [illegible] 250
	H [illegible]
B	[illegible]
D	H [illegible] HP-PC-3 [illegible]
C	修正 [illegible] RN C6 [illegible] C17 [illegible]
	H2D-C3 [illegible] 3W [illegible] C5 [illegible]
	18 [illegible] C27 [illegible] 7/19 [illegible]



說明 GENERAL NOTES

飛宏企業股份有限公司
PHIHONG ENTERPRISE CO., LTD.

		型號 MODEL	PSM-1123
		材質 MATERIAL	
		處理 TREATMENT	
核准 APPROVED		公差 TOLERANCE	圖名 DESCRIPTION
審核 CHECKED		比例尺 SCALE	SCHEMATIC
設計 DESIGN		單位 UNIT MM	PES-30157
繪圖 DRAWN			

THIRD ANGLE PROJECTION SHEET OF

REV	DESCRIPTION	DATE	APRVL	MANAGER
1	Engineering Prototype	07/13/86	GRR	
2	Advanced Engineering Release	11/23/86	GRR	
3	Pilot Production Release (FTZ)	02/04/87	GRR	
4	Pilot Production Release (FCC)	VOID	GRR	
5	Pilot Production Release	05/04/87	GRR	
6	REVISED PER ECO 370257	9/4/87		Bucha

Jumpers and Test Points

JP1 - System Reset vs. Keyboard Reset
JP2 - Memory Expansion Address Select
JP3 - Internal Memory Address Select

TP1 - 64 Hz Real-Time Clock Test Point

SIGNAL	DESCRIPTION
28MHZ	28.63636 MHz Master Clock
7MHZ	7 MHz Processor Clock
A[23:1]	Processor Address (68000)
ACK	Data Acknowledge (Parallel)
AS	Address Strobe (68000)
AUDIN	Audio Input (RS232 jack)
AUDOUT	Audio Output (RS232 jack)
BEER	Bus Error (68000)
BG	Bus Grant (68000)
BGACK	Bus Grant Acknowledge (68000)
BLISS	Blitter Slowdown (chips)
BLIT	Chip Memory Access (chips)
BR	Bus Request (68000)
BUSY	Device Busy (parallel)
CASL/CASU	CAS lower/upper byte (DRAM)
CCK	Color Clock aka C1 (chips)
CCKQ	Color Clock Quadrature aka C3 (chips)
CDAC	7 MHz Quatrature Clock
CHNG	Media Change (floppy)
CLKRD/CLKWR	Real-time Clock Read/Write
COMP	Composite Monochrome Video (video)
CSYNC	Composite Sync (video)
CTS	Clear to Send (rs232)
D[15:0]	Processor Data (68000)
DIR	Direction (floppy)
DKRD	Diskette Read Data (floppy)
DKWDB	Diskette Write Data (floppy)
DKWEB	Diskette Write Enable (floppy)
DMAL	Chip DMA Request (chips)
DRA[8:0]	DRAM Address (DRAM; chips)
DRD[15:0]	DRAM Data (DRAM, chips)
DSR	Data Set Ready (rs232)
DTACK	Data Transfer Acknowledge (68000)
DTR	Data Terminal Ready (rs232)
E	Peripheral E Clock (68000)
EXRAM	Expansion Memory Present
FC[0:0]	Function Control (68000)
FIRE0/FIRE1	Fire Button (joysticks)
HLT	Processor Halt (68000)
HSYNC	Horizontal Sync (video)
INDEX	Diskette Index Hole (floppy)
INT[2,3,6]	Interrput Requests (chips)
IORESET	I/O Reset
IPL[2:0]	Processor Interrupt Requests (68000)
KBCLOCK	Keyboard Clock (keyboard)
KBDATA	Keyboard Data (keyboard)
KBRESET	Keyboard Reset (keyboard)
LDS/UDS	Upper/Lower Data Strobe (68000)
LED	Power On LED

SIGNAL	DESCRIPTION
LEFT/RIGHT	Audio Channels
MTR	Motor On (floppy)
MTR0	Motor On Drive 0 (floppy)
M0V/M0H	Mouse Quadrature Signals (joysticks)
M1V/M1H	Mouse Quadrature Signals (joysticks)
OVL	Overlay ROM over RAM
OVR	Override System Decodeing
PIXELSW	Pixel Switch (video)
POT0X/POT0Y	Pot Lines (joysticks)
POT1X/POT1Y	Pot Lines (joysticks)
POUT	Paper Out (parallel)
PPD[7:0]	Parallel Port Data (parallel)
RAMEN	RAM Enable (chips)
REGEN	Chip Register Enable (chips)
RAS0/RAS1	RAS Internal/Expansion Lines (DRAM)
RDY	Drive Ready (floppy)
RESET	General Reset
RGA[8:1]	Register Address Bus (chips)
RI	Ring Indicate (rs232)
ROMEN	ROM Enable
RTS	Request to Send (rs232)
RST	Processor Reset (68000)
RXD	Receive Data (RS232)
RW	Processor Read/Write (68000)
SEL	Select (parallel)
SEL[3:0]	Drive Select (floppy)
SIDE	Side Select (floppy)
STEP	Head Step Command (floppy)
TRK0	Track 0 Sense (floppy)
TXD	Transmit Data (RS232)
VMA	Valid Memory Address (68000)
VPA	Valid Peripheral Address (68000)
VSYNC	Verticl Sync (video)
WE	Write Enable (DRAM)
WPROT	Write Protect Sense (floppy)
XCLK	External 28 MHz Clock (genlock)
XCLKEN	External Clock Enable (genlock)
XRDY	External Data Ready

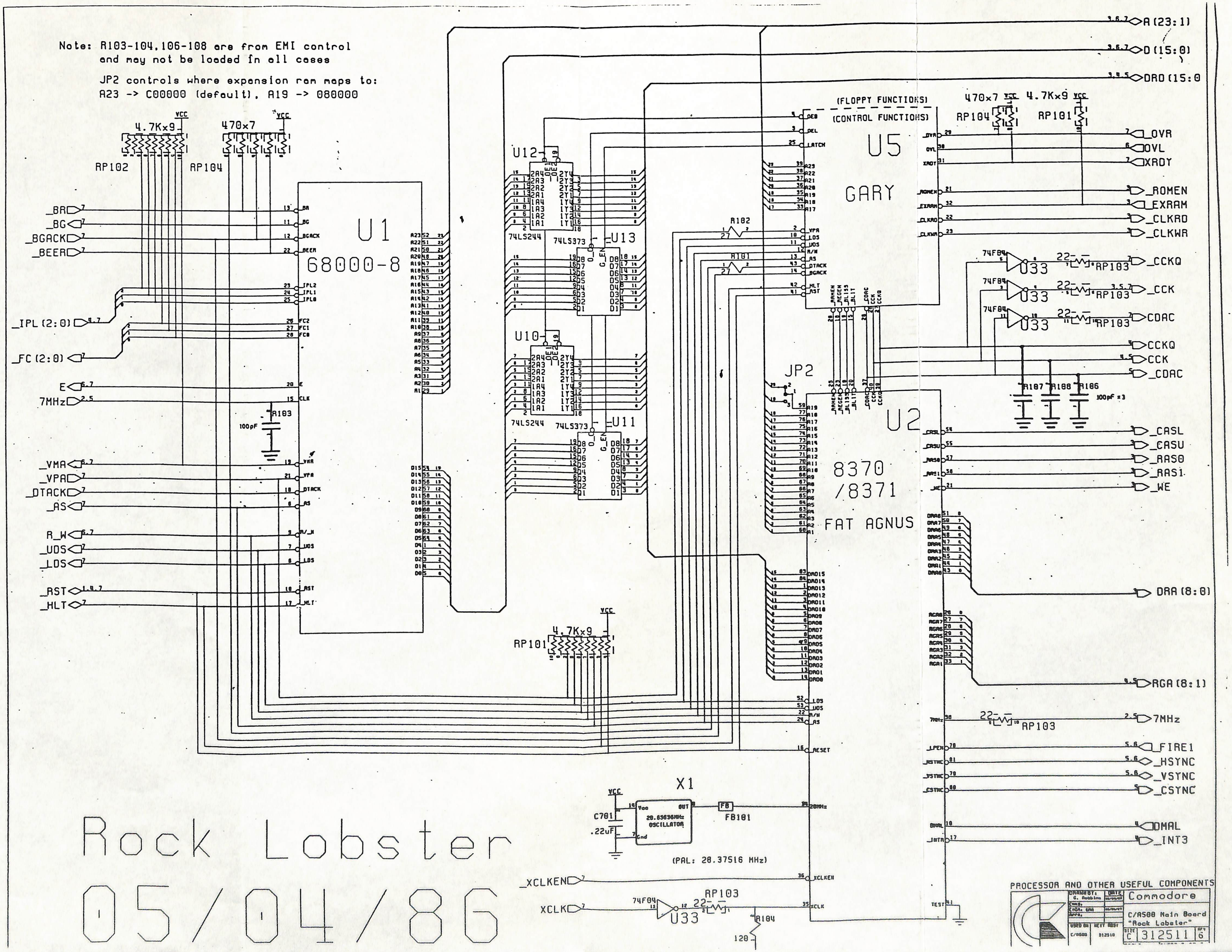
ATTEMPT TO FORCE NODE NUMBERS VIA SEQUENCE

A PAGE FOR SHARON AND VONNIE TO USE

DRAWN BY: G. Robbins
CHKD:
ENGR: GRR
APPR:
Commodore
C/A500 Main Board
"Rock Lobster"
USED ON: C/A500
NEXT ASSY: 312510
SIZE: C
312511
REV: 6
SCALE
SHEET 1 OF 9

Note: R103-104,106-108 are from EMI control
and may not be loaded in all cases

JP2 controls where expansion ram maps to:
A23 -> C00000 (default), A19 -> 080000



Rock Lobster

05/04/86

PROCESSOR AND OTHER USEFUL COMPONENTS

DRAWN BY: G. Robbins

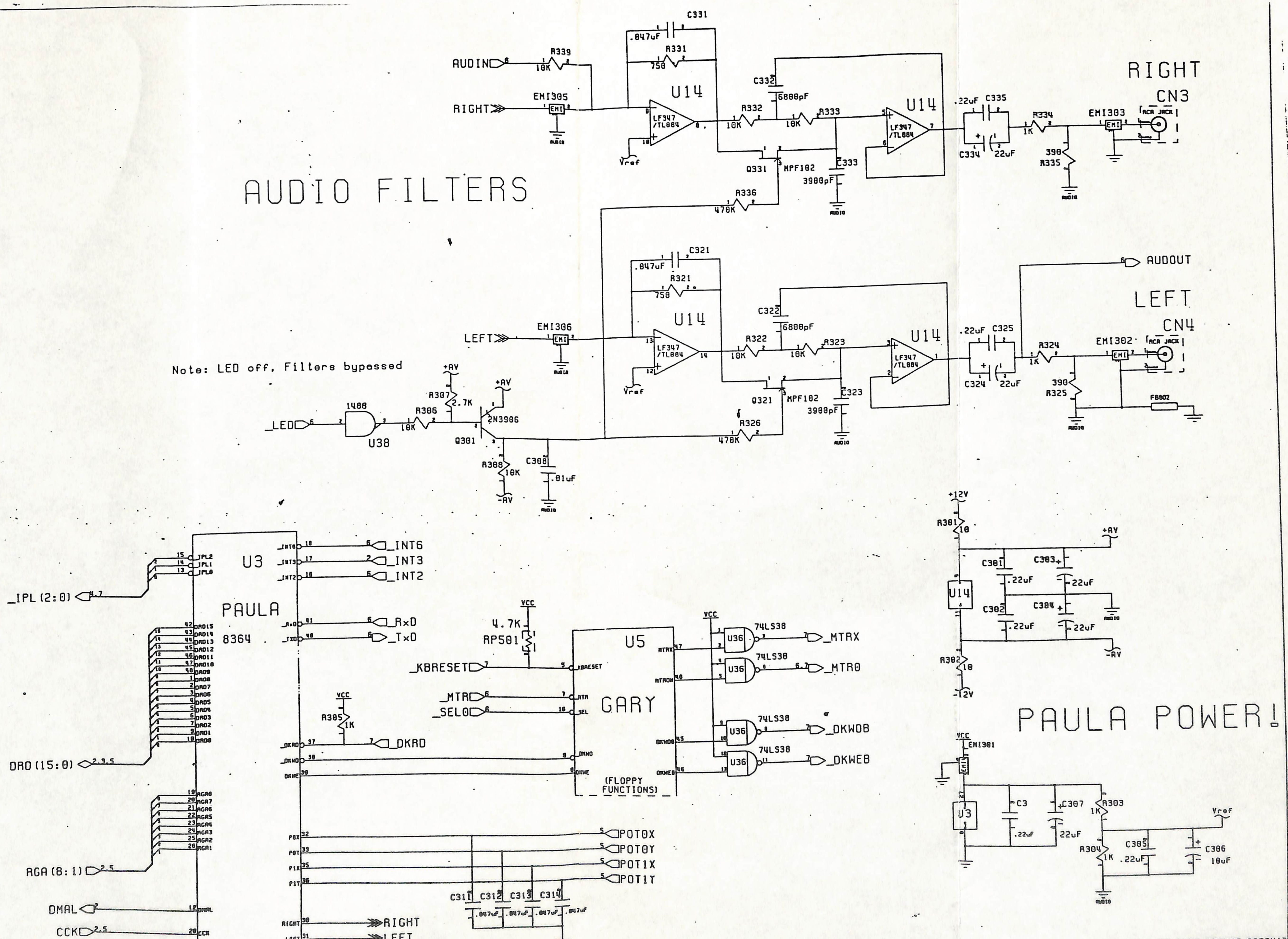
Commodore

C/A500 Main Board
"Rock Lobster"

USED ON C/A500

NEXT ASSY 312510

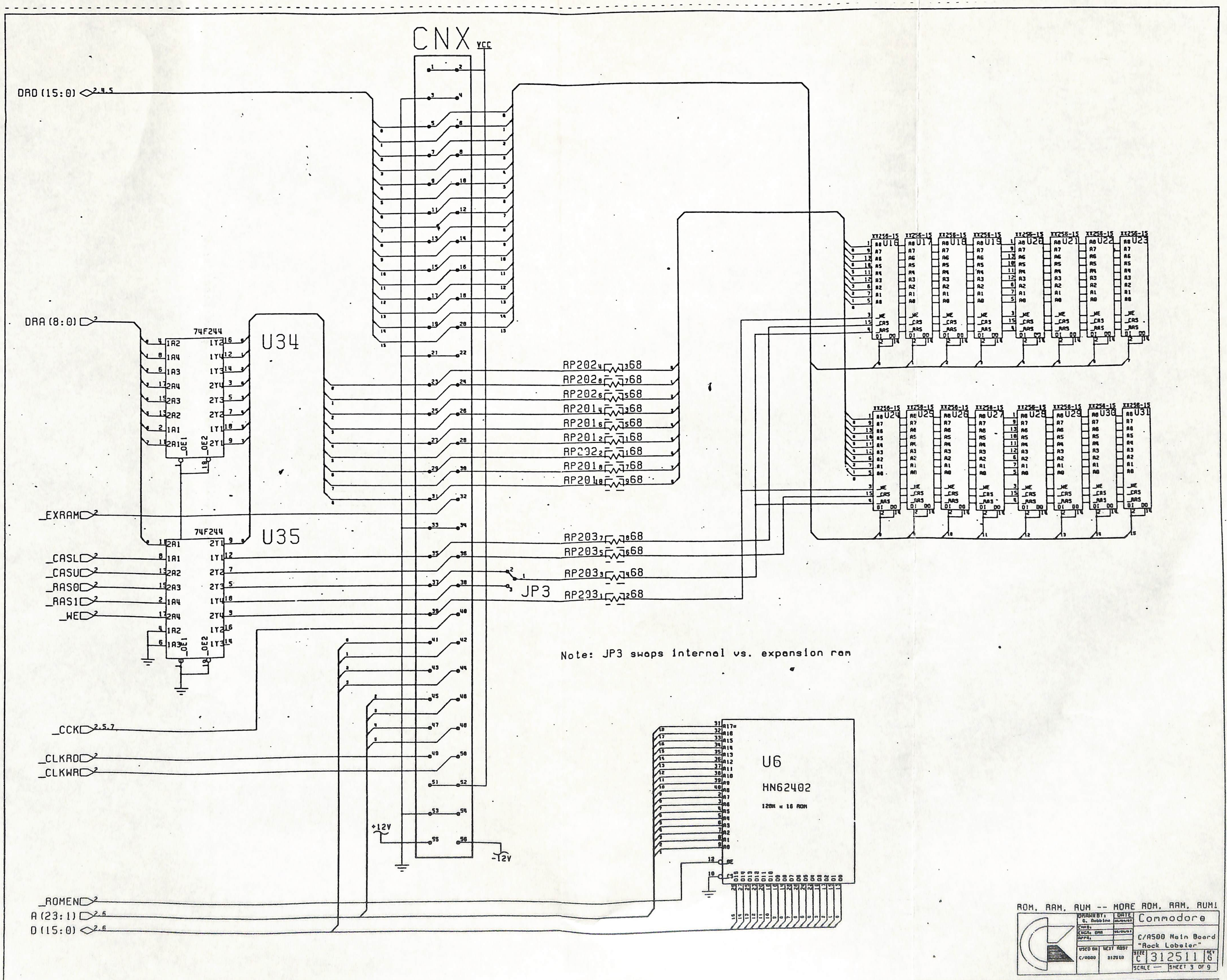
SIZE C 312511 REV 6



PAULA DOES THINGS THAT DENISE DOESN'T

DRAWN BY: G. Robbins
Commodore
C/A500 Main Board
"Rock Lobster"
USED ON C/A500
NEXT ASSY 312510
SIZE C 312511 REV 6
SCALE
SHEET 4 OF 9

Note: Gound connection at Audio jacks



Note: JP3 swaps internal vs. expansion ram

ROM, RAM, RUM -- MORE ROM, RAM, RUM!

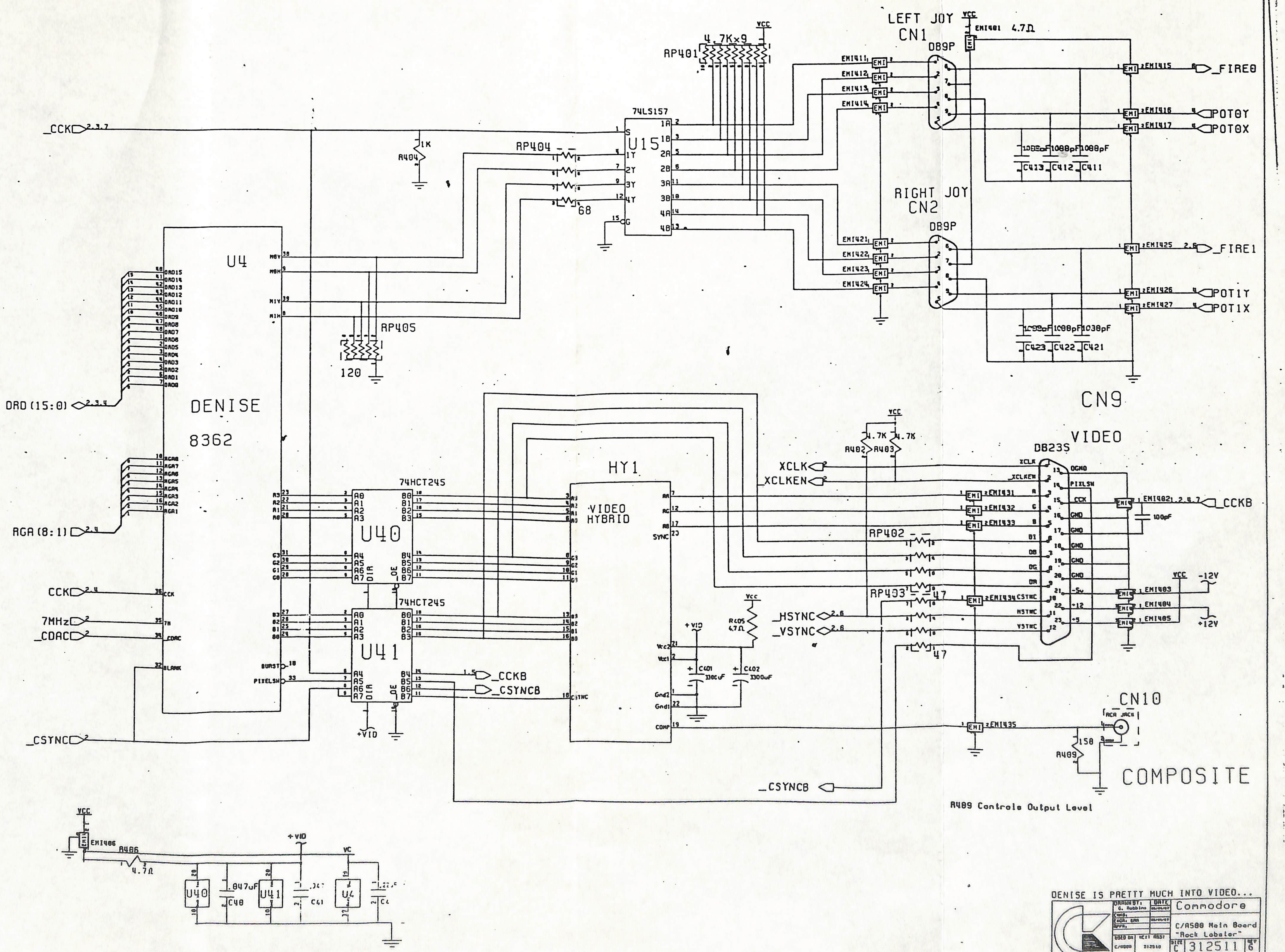
DRAWN BY: G. Robbins
DATE
CHKD:
ENGR: GRR
APPR:
USED ON C/A000
NEXT ASSY 312510

Commodore

C/A500 Main Board
"Rock Lobster"

SIZE C 312511 REV 6

SCALE —
SHEET 3 OF 9



note: EMI401 is loaded with 4.7 Ohm Resistor

R409 Controls Output Level

DENISE IS PRETTY MUCH INTO VIDEO...

Commodore

DRAWN BY: G. Robbins

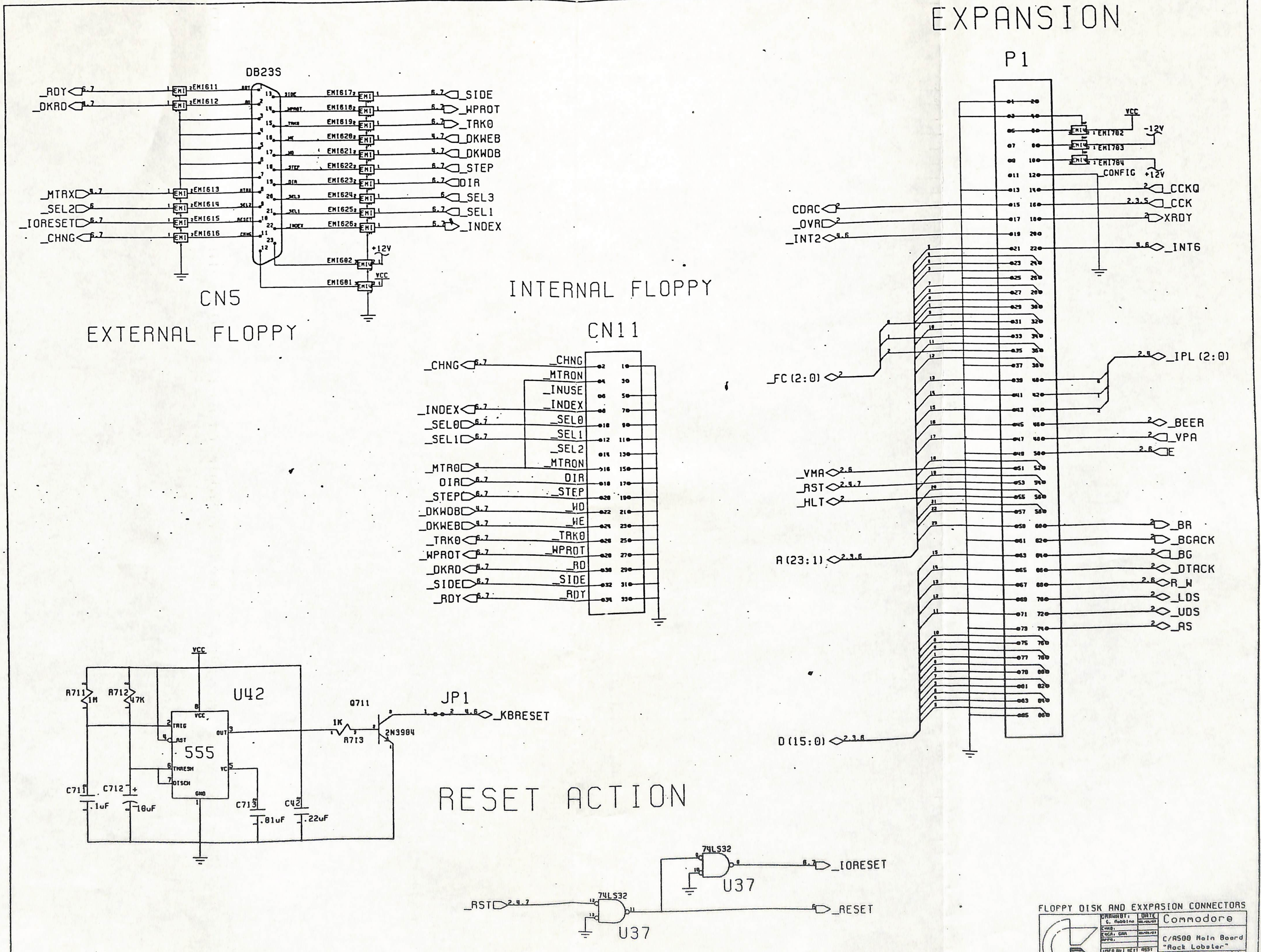
C/A500 Main Board
"Rock Lobster"

USED ON C/A500

NEXT ASSY 312510

SIZE C 312511 REV 6

SCALE SHEET 5 OF 9



FLOPPY DISK AND EXXPASION CONNECTORS

DRAWN BY: G. Robbins

CHKD.

ENGR. GMR

APPD.

USED ON C/A500

NEXT ASSY 312510

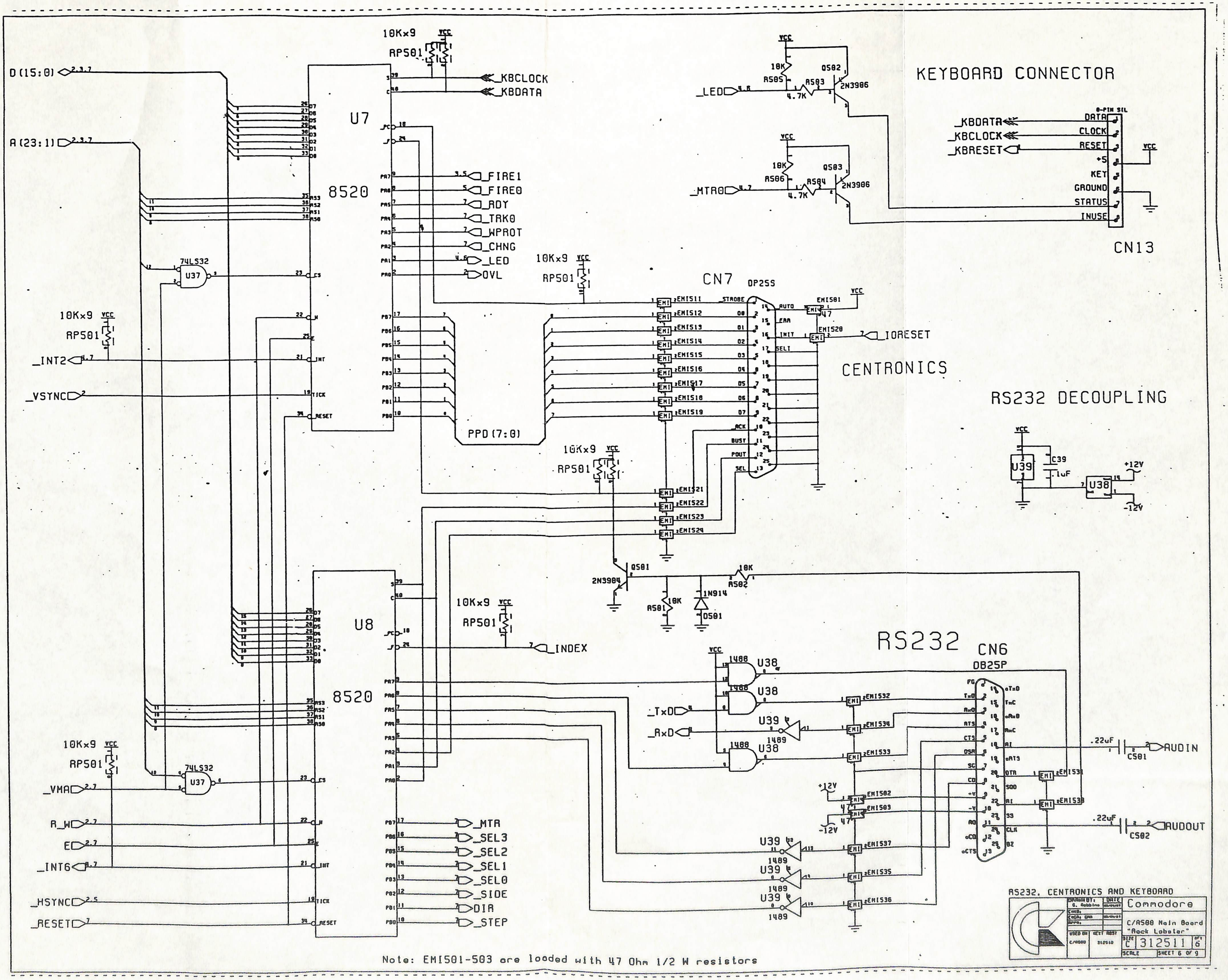
Commodore

C/A500 Main Board
"Rock Lobster"

SIZE C 312511 REV 6

SCALE

SHEET 7 OF 9



Note: EMI501-503 are loaded with 47 Ohm 1/2 W resistors

RS232. CENTRONICS AND KEYBOARD

DRAWN BY: G. Robbins

Commodore

C/A500 Main Board "Rock Lobster"

USED ON C/A500

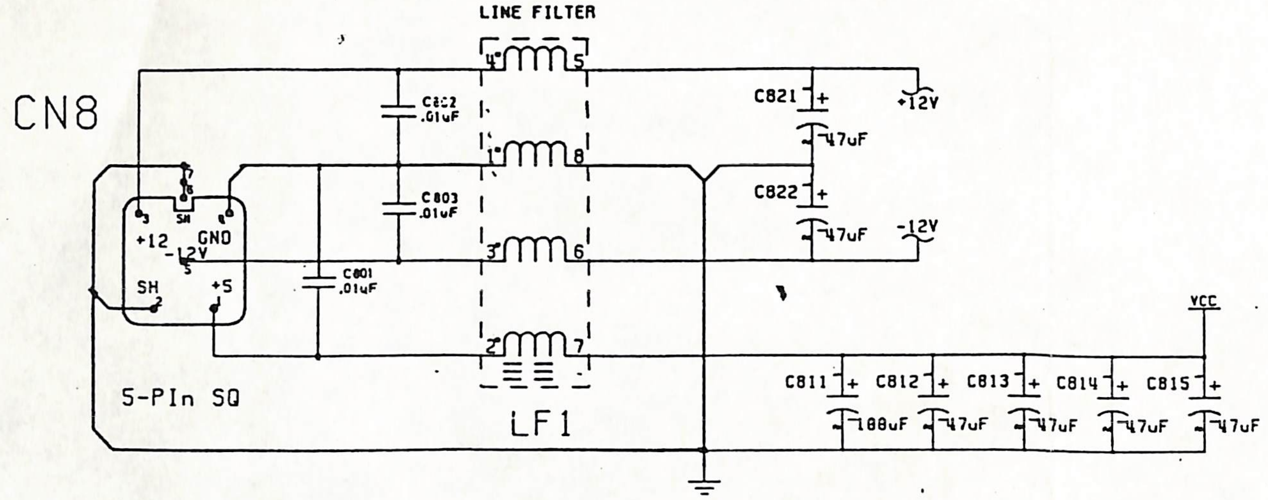
NEXT ASSY 312510

SIZE C 312511 REV 6

SCALE

SHEET 6 OF 9

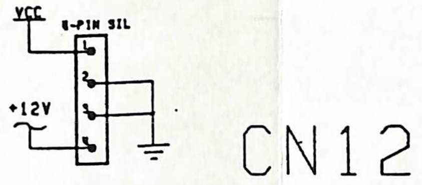
POWER INPUT



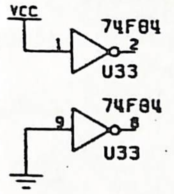
NOTE: HEAVY LINES INDICATE A
SINGLE POINT CONNECTION.

W1 AND W2 ARE GROUND PLANE CONTINUITY JUMPERS

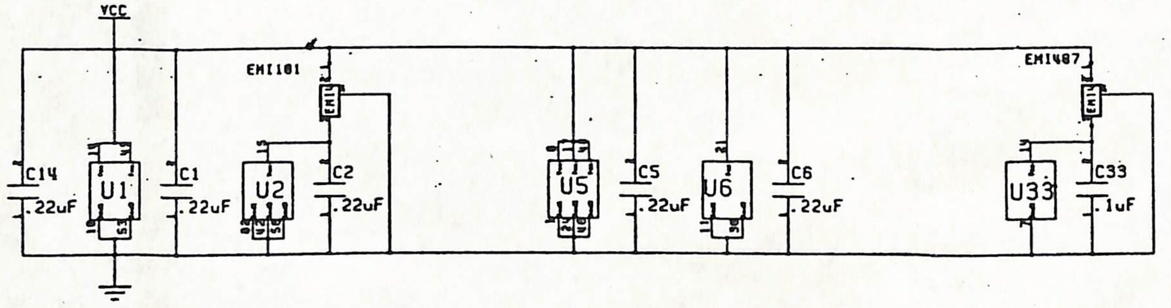
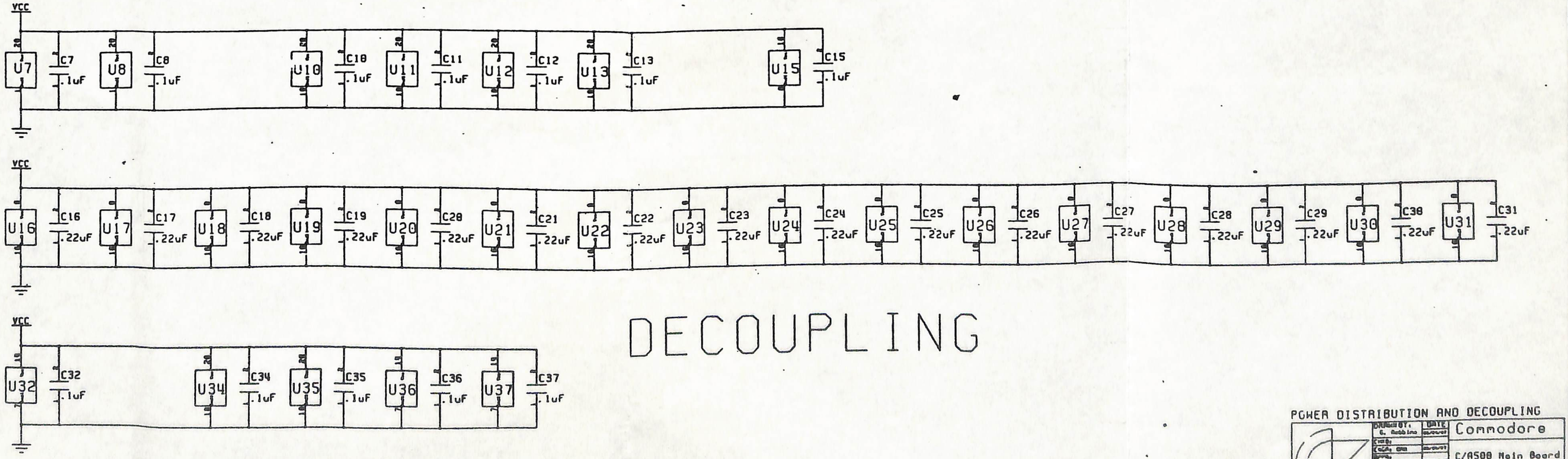
FLOPPY POWER



SPARES



DECOUPLING

POWER DISTRIBUTION AND DECOUPLING

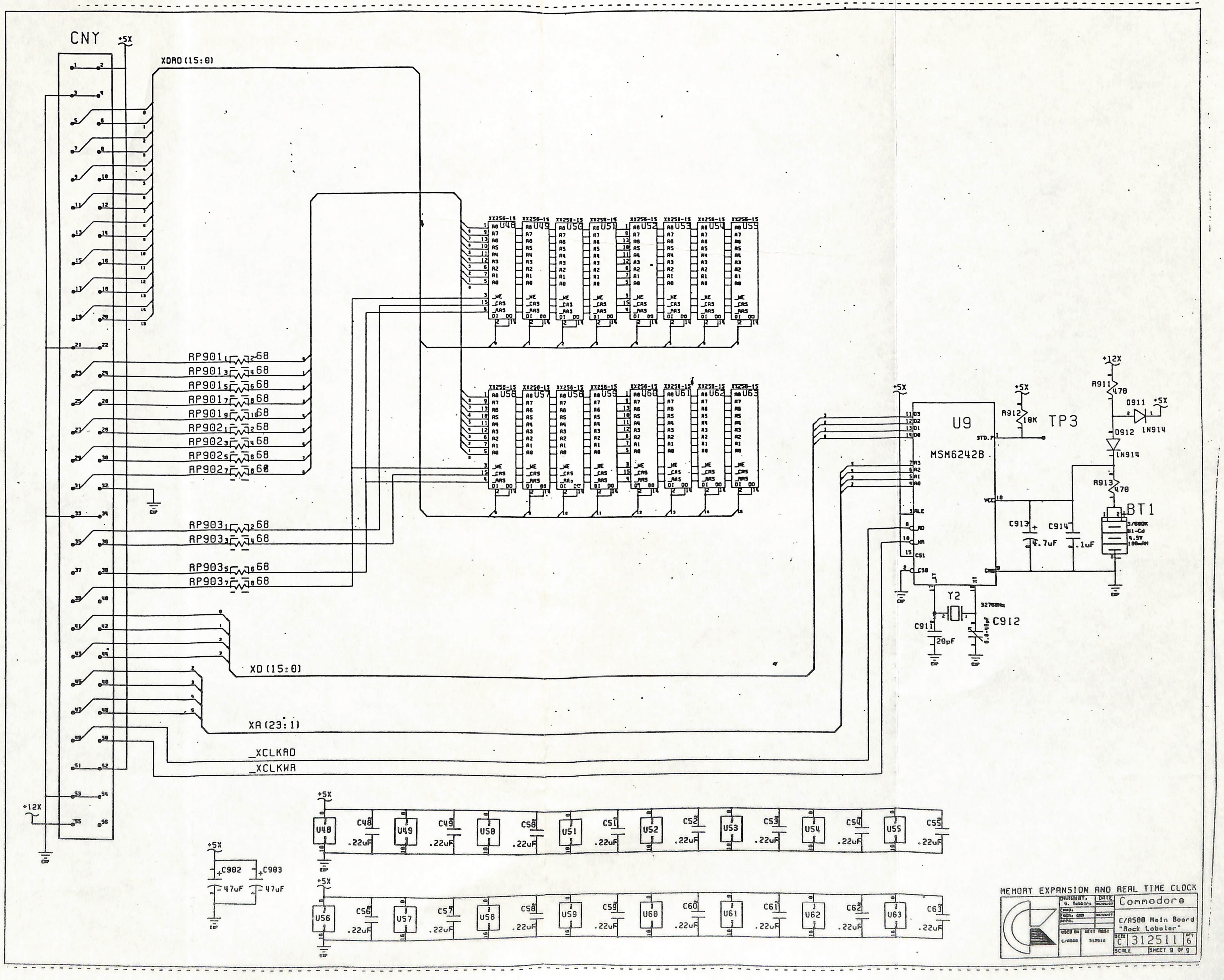
DRAWN BY: G. Robbins

Commodore

C/A500 Main Board
"Rock Lobster"

SIZE C 312511 REV 6

SCALE SHEET 8 OF 9



MEMORY EXPANSION AND REAL TIME CLOCK

DRAWN BY: G. Robbins	DATE
CHKD.	
ENGR. GRR	
APPD.	
USED ON C/A500	NEXT ASSY 312510

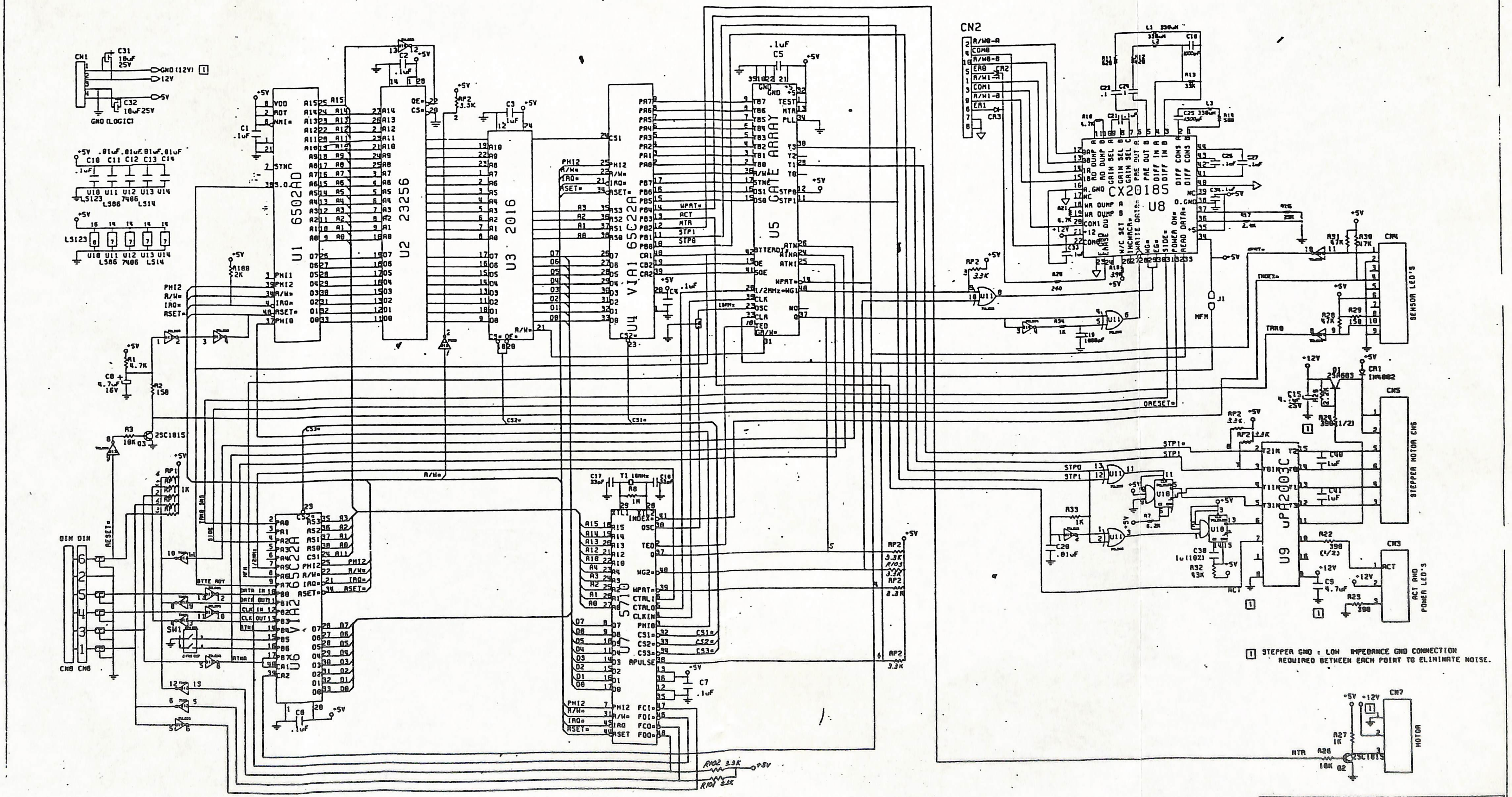
Commodore

C/A500 Main Board
"Rock Lobster"

SIZE C | 312511 | REV 6

SCALE | SHEET 9 OF 9

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	2	ADVANCED_ENGINEERING_RELEASE	6-17-86	
	3	PILOT PRODUCTION RELEASE	1-6-87	2-17-87
	4	REVISED PER ECO 870123	4-23-87	Burke

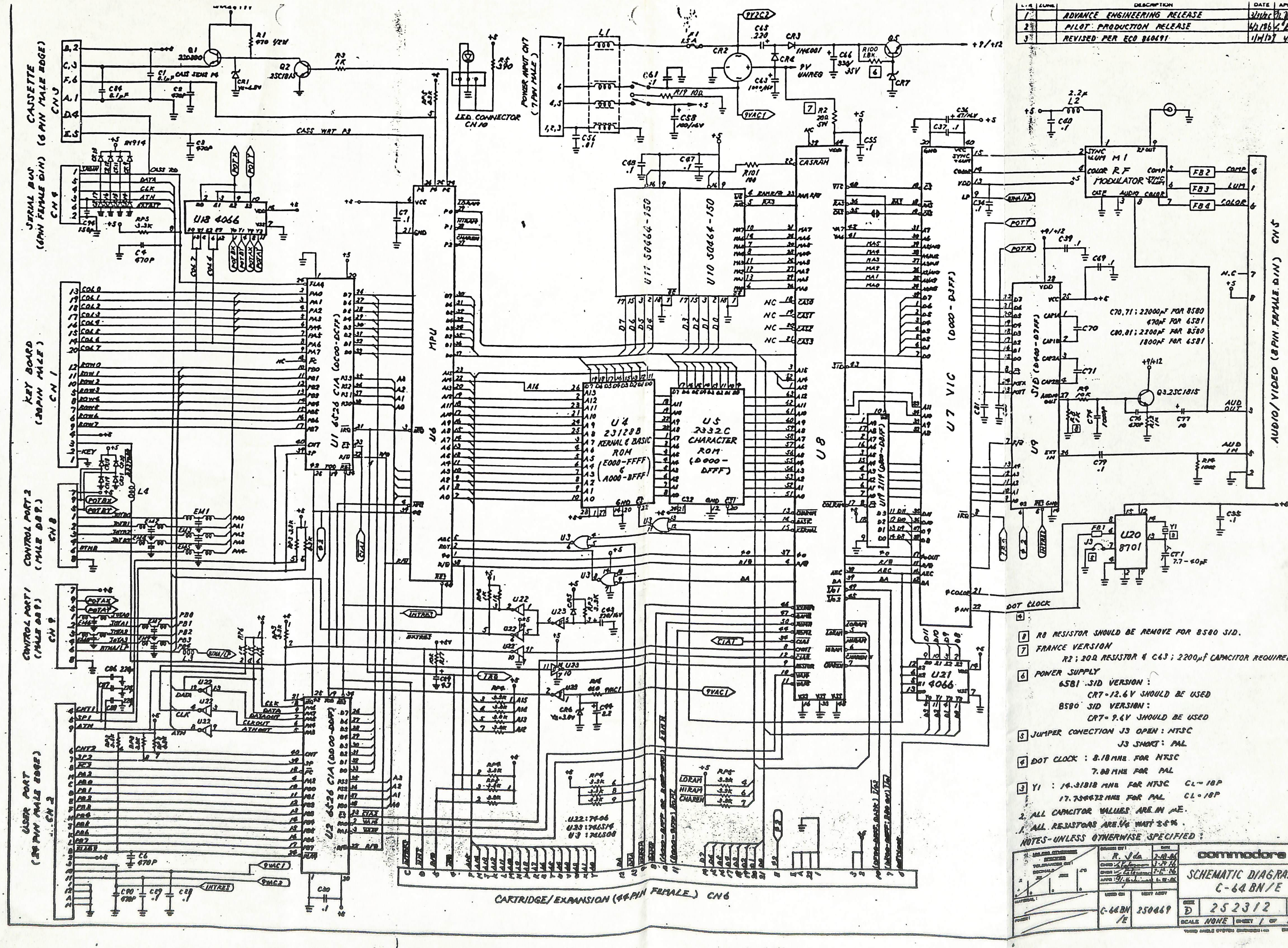


1 STEPPER GND : LOW IMPEDANCE GND CONNECTION REQUIRED BETWEEN EACH POINT TO ELIMINATE NOISE.

DRAWN BY:	DATE	COMMODORE
H. Kouzai	01-07-86	
CHKD: Nishizaki	01-08-86	SCHEMATIC 1571 CR DISK
ENGR:		
APPR:	2-17-87	

USED ON	NEXT ASSY	SIZE		REV
1571 CR		D	252305	3
		SCALE NONE	SHEET 1 OF 1	

LTR	ZONE	DESCRIPTION	DATE	APPROVED
1		ADVANCE ENGINEERING RELEASE	3/31/86	
2		PILOT PRODUCTION RELEASE	6/2/86	S. Katayama
3		REVISED PER ECO 860691	1/14/87	


CASSETTE (6 PIN MALE EDGE) CN 3
SERIAL BUS (6 PIN FEMALE DIN) CN 4
KEY BOARD (20 PIN MALE) CN 1
CONTROL PORT 2 (MALE D.B.9.) CN 8
CONTROL PORT 1 (MALE D.B.9.) CN 9
USER PORT (24 PIN MALE EDGE) CN 2
LED CONNECTOR CN 10
POWER INPUT CN 7 (7 PIN MALE)
U13 4066
U1 6526 CIA (DC00-DCFF)
U2 6526 CIA (DD00-DDFF)
U6 MPU
U11 50464-150
U10 50464-150
U4 23128B KERNAL & BASIC ROM (E000-FFFF & A000-BFFF)
U5 2332C CHARACTER ROM (D000-DFFF)
U8
U19 2119 (D800-DBFF)
U7 VIC (D000-D3FF)
U9 SID (D400-D7FF)
M1 R.F MODULATOR
U20 8701
U21 4066
U22: 7406
U33: 74LS14
U3: 74LS08
AUDIO/VIDEO (8 PIN FEMALE DIN) CN 5
CARTRIDGE/EXPANSION (44 PIN FEMALE) CN6
C70, 71: 22000pF FOR 8580
470pF FOR 6581
C80, 81: 2200pF FOR 8580
1800pF FOR 6581
DOT CLOCK
9VAC1
9VAC2
+9/+12

8 R8 RESISTOR SHOULD BE REMOVE FOR 8580 SID.

7 FRANCE VERSION

R2 ; 20Ω RESISTOR & C63 ; 2200μf CAPACITOR REQUIRED.

6 POWER SUPPLY

6581 SID VERSION :

CR7=12.6V SHOULD BE USED

8580 SID VERSION :

CR7=9.6V SHOULD BE USED

5 JUMPER CONECTION J3 OPEN : NTSC

J3 SHORT : PAL

4 DOT CLOCK : 8.18 MHZ FOR NTSC

7.88 MHZ FOR PAL

3 Y1 : 14.31818 MHZ FOR NTSC CL=18P

17.734472 MHZ FOR PAL CL=18P

2. ALL CAPACITOR VALUES ARE IN μF.

1. ALL RESISTORS ARE 1/4 WATT ±5%.

NOTES-UNLESS OTHERWISE SPECIFIED :

R. Ida 2-18-86

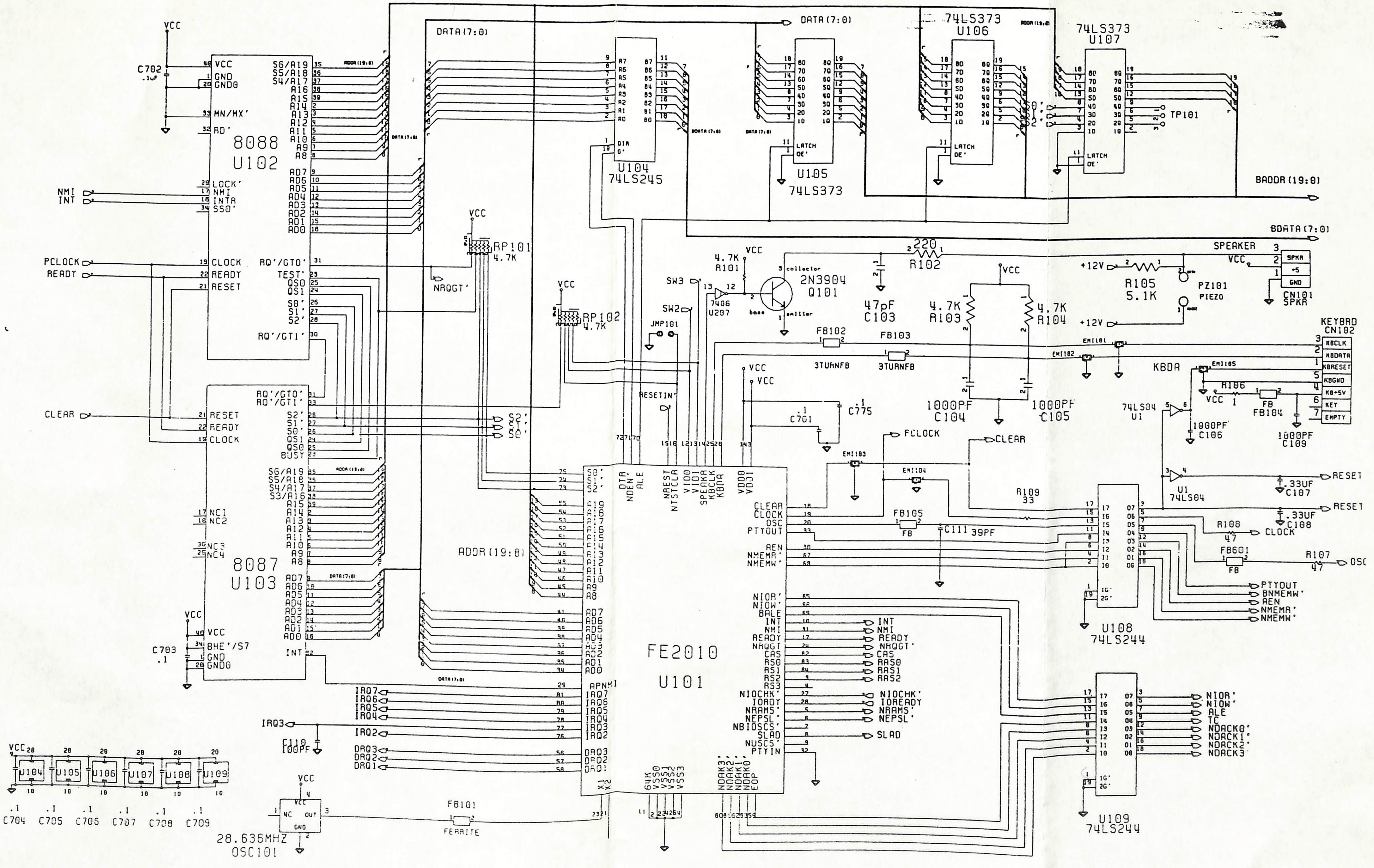
commodore

SCHEMATIC DIAGRAM,
C-64 BN/E

C-64BN/E
250469

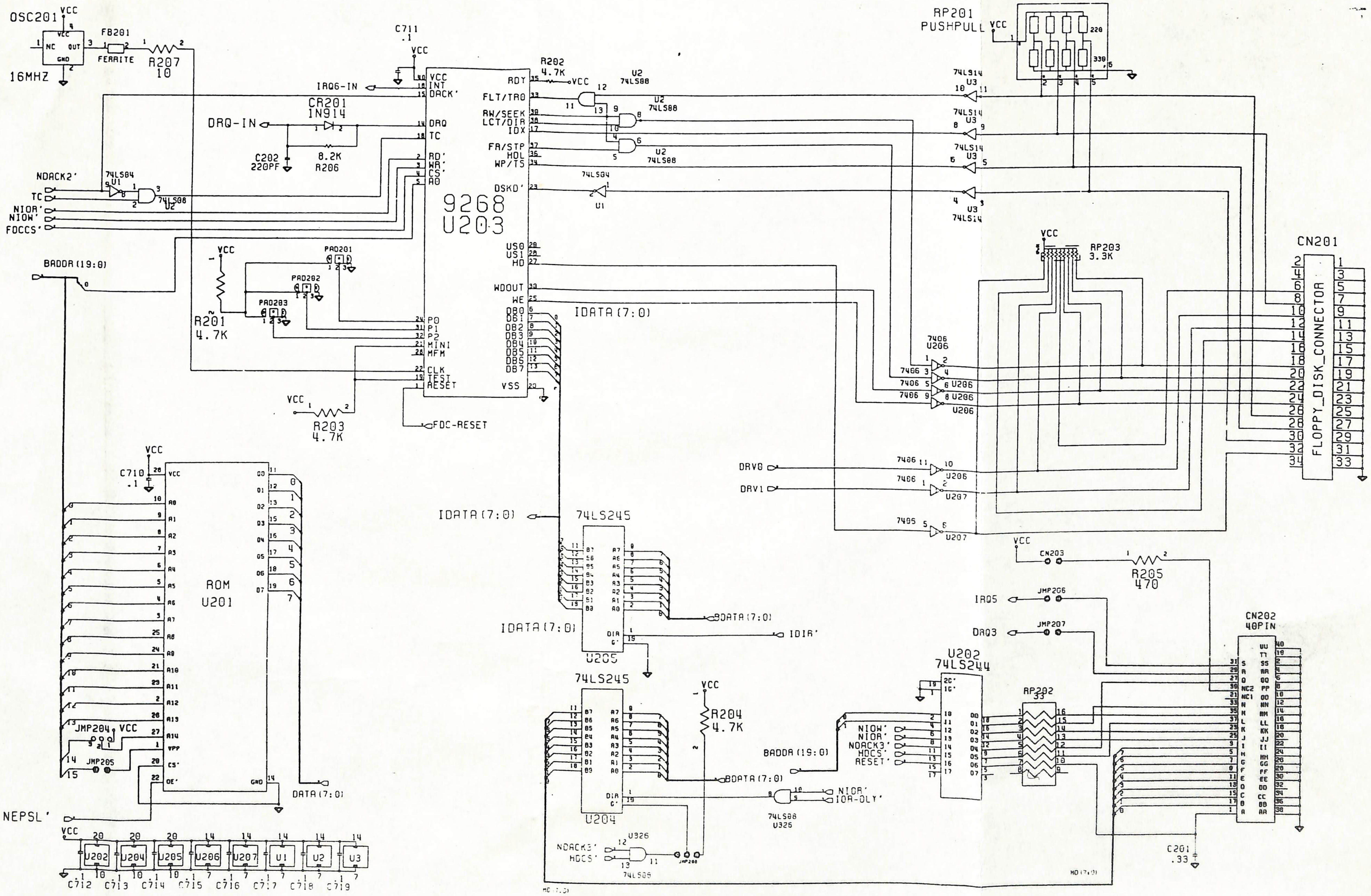
D 252312 3

SCALE NONE SHEET 1 OF 1



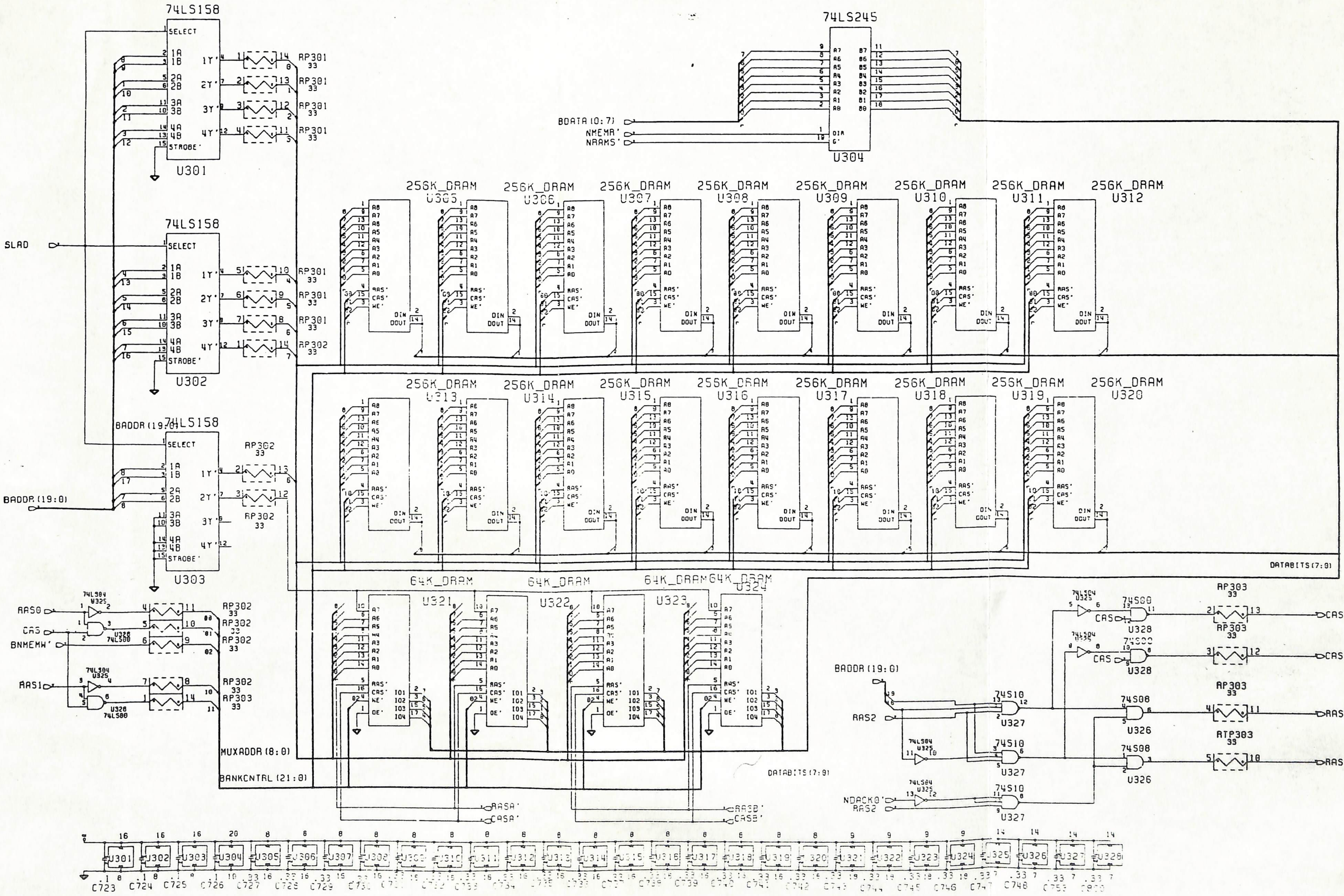
Schematic #312626

Sheet 1 of 6



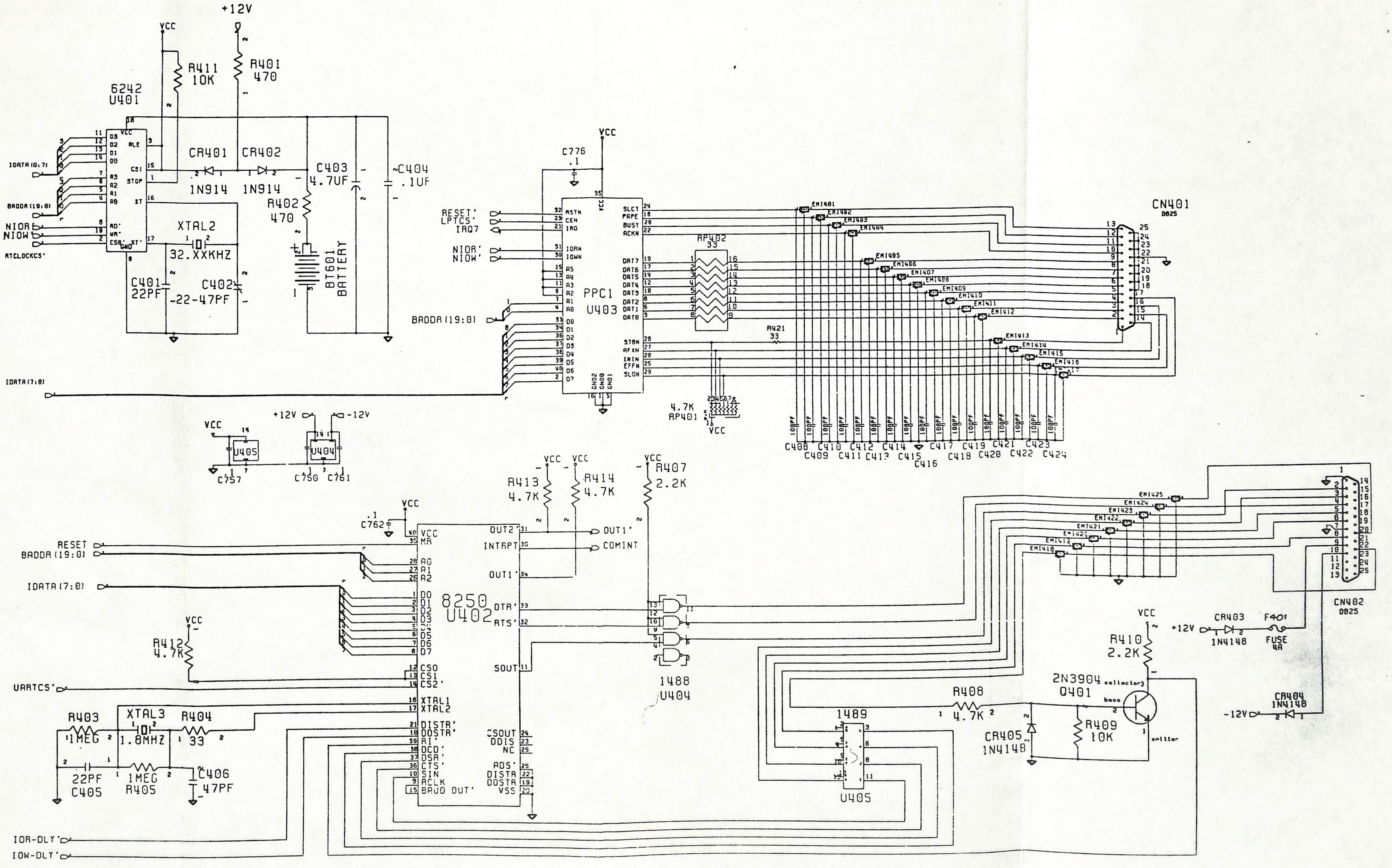
Schematic #312626

Sheet 2 of 6



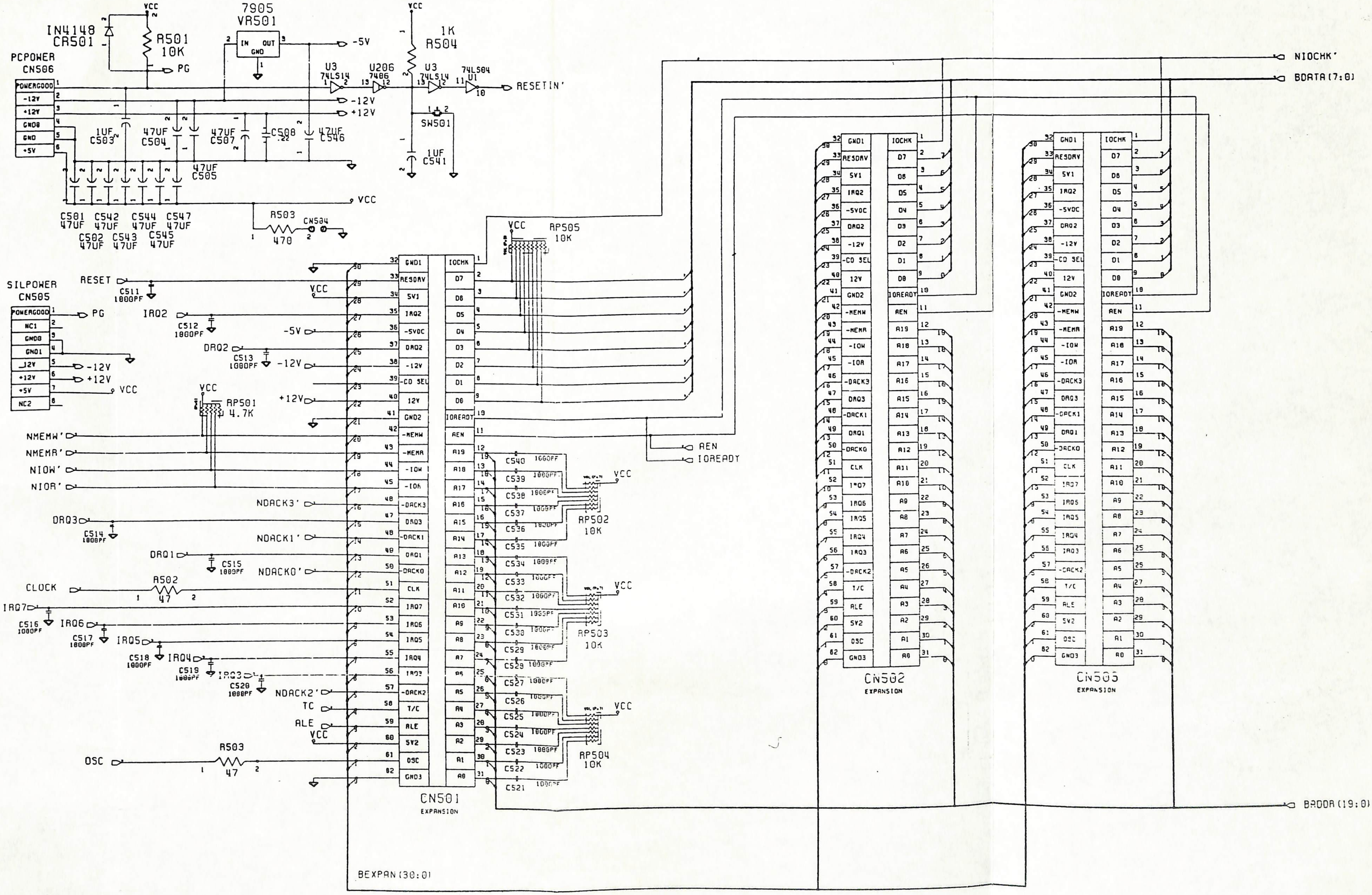
Schematic #312626

Sheet 3 of 6



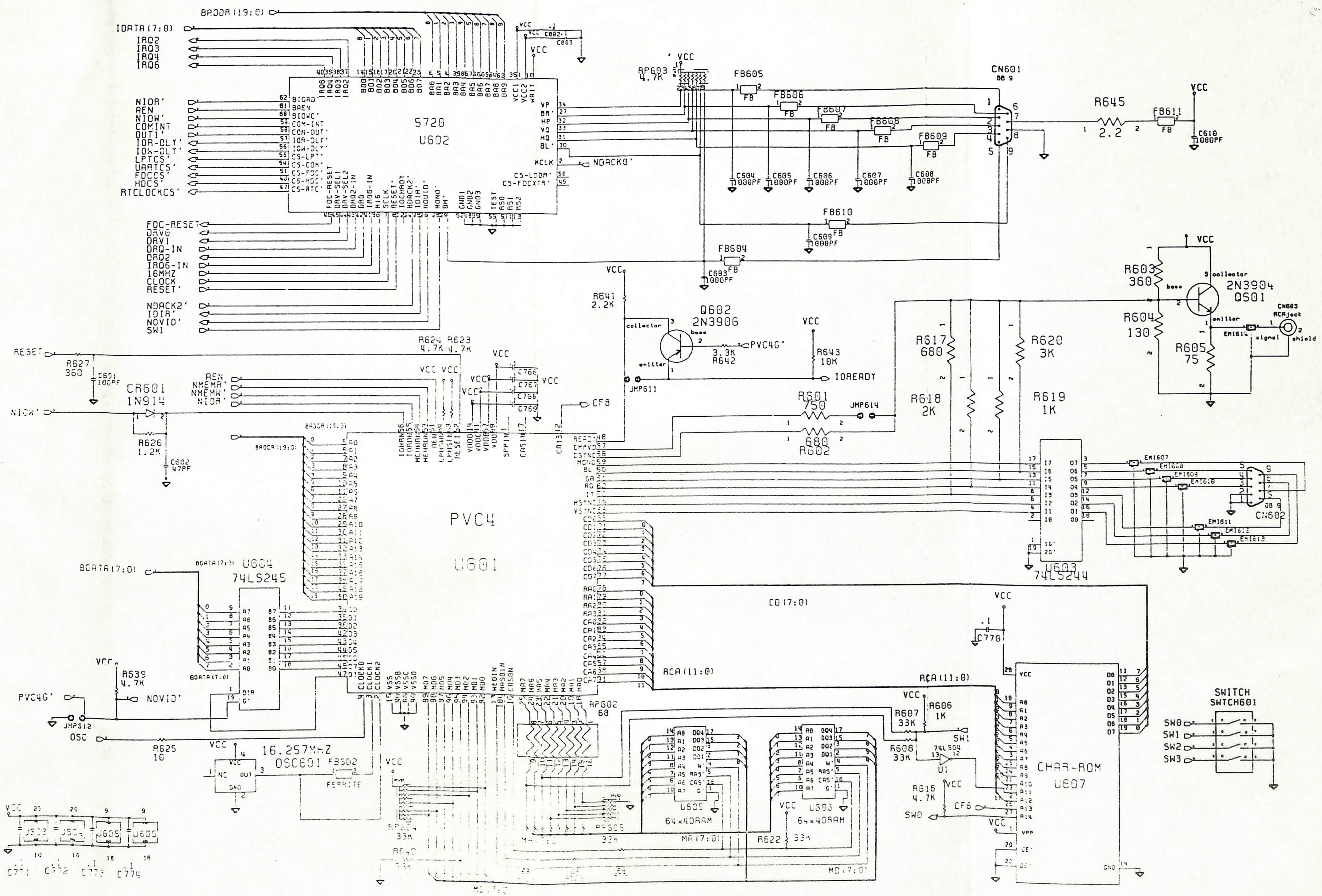
Schematic #312626

Sheet 4 of 6



Schematic #312626

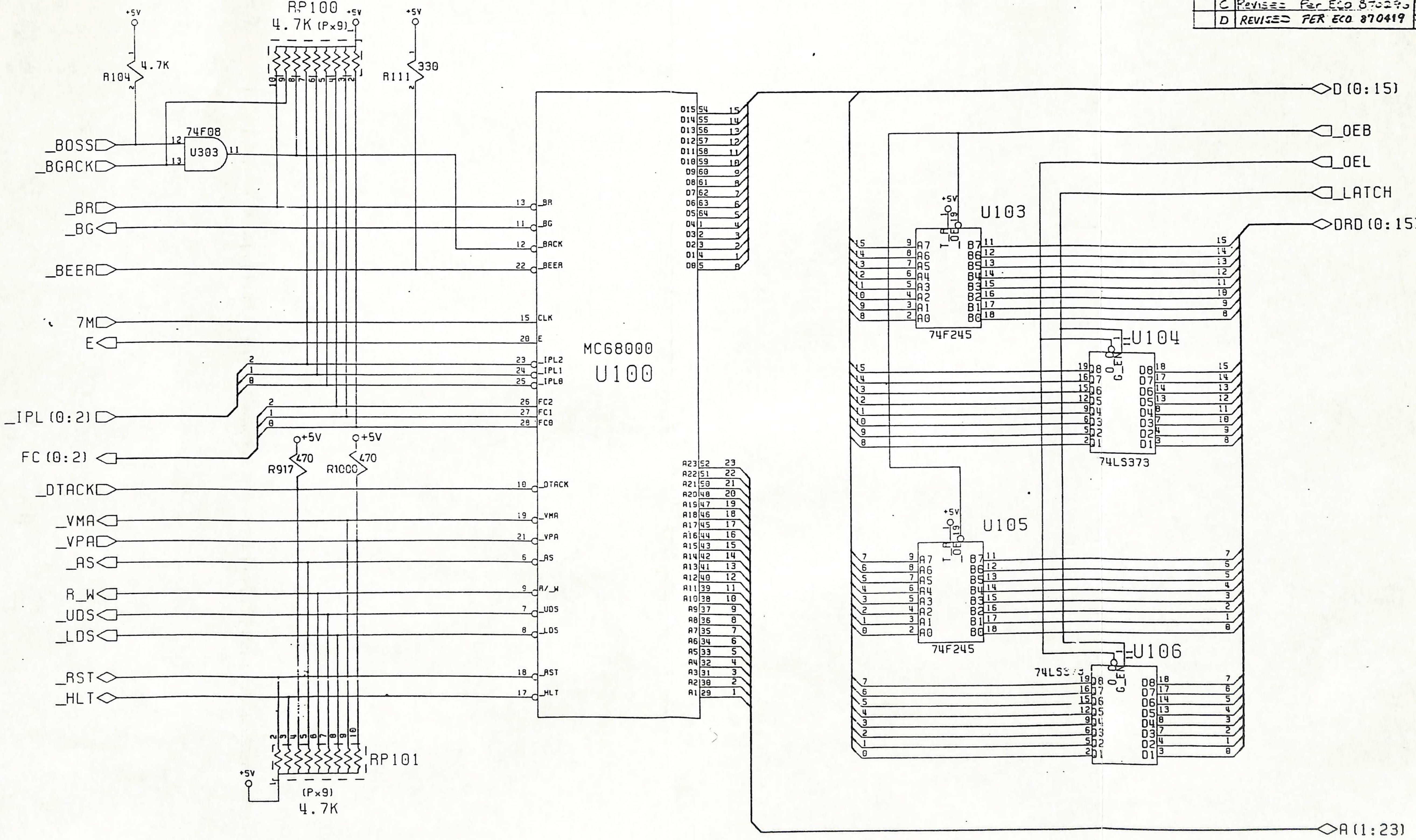
Sheet 5 of 6

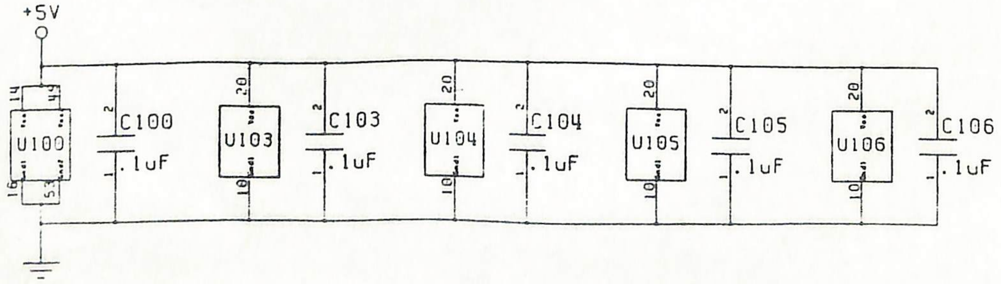


Schematic #312626

Sheet 6 of 6

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	2	ADVANCED ENGINEERING RELEASE		
	3	PILOT PRODUCTION RELEASE		
	A	PRODUCTION RELEASE		
	B	Revised Per ECO 870270	[illegible]	R-Bur[illegible]
	C	Revised Per ECO 870290	[illegible]	R-Bur[illegible]
	D	REVISED PER ECO 870419	1/12/88	R-Burbo





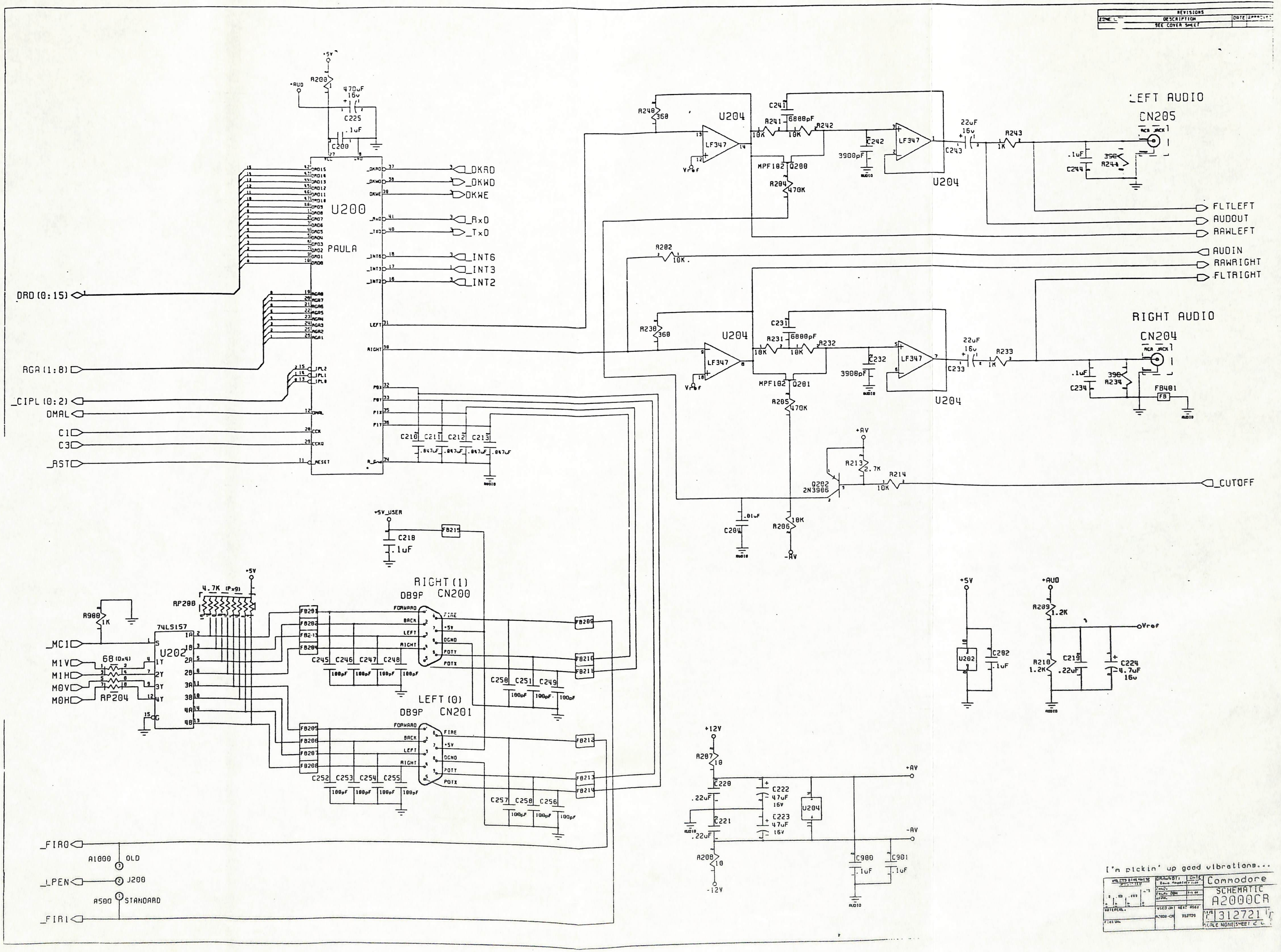
Something in the way she moves...

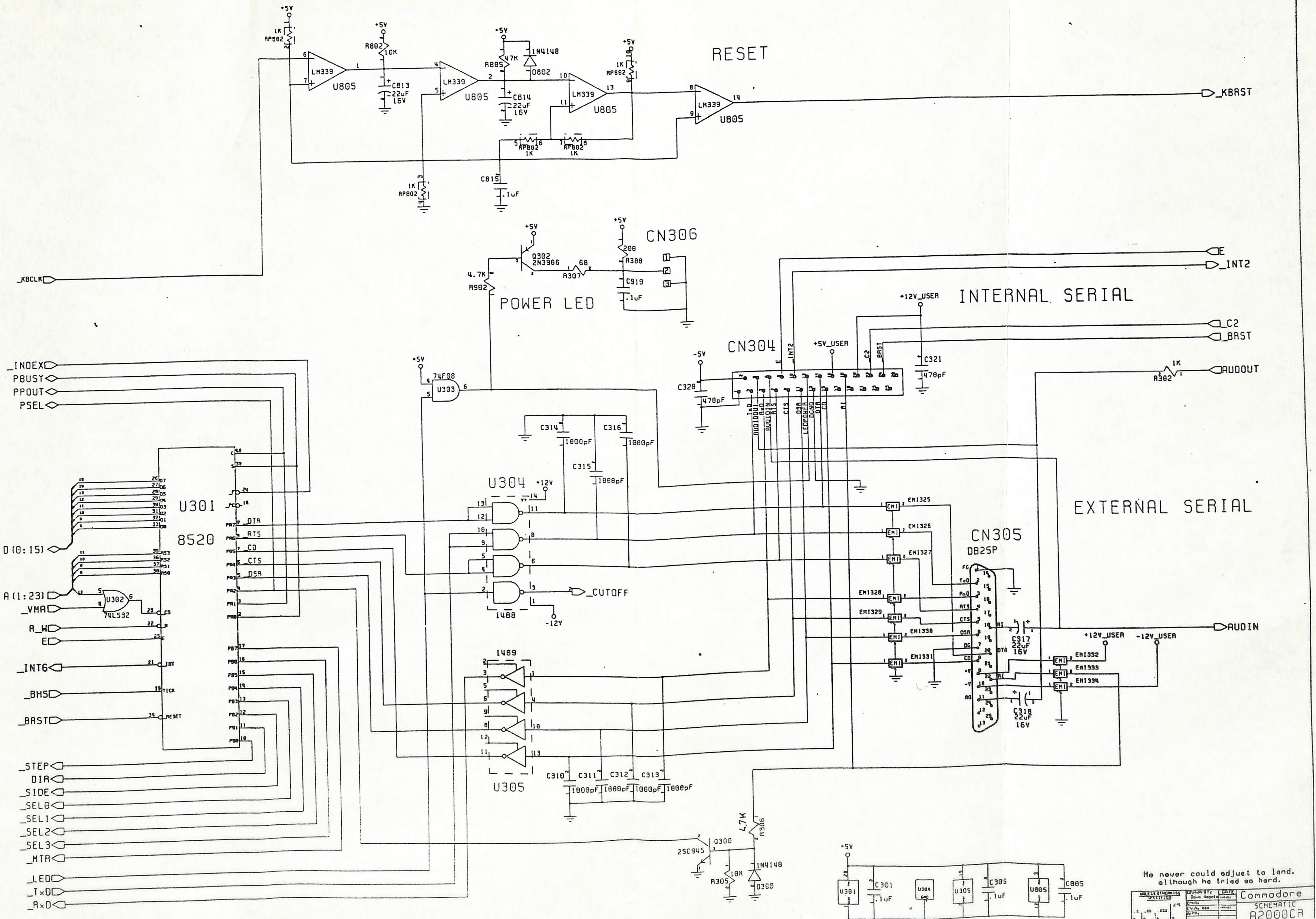
UNLESS OTHERWISE SPECIFIED
DRAWN BY: Dave Haynie 7/6/87
CHKD: DBH 7/6/87
USED ON A2000-CR
NEXT ASSY 312725

Commodore

SCHEMATIC
A2000CR

SIZE C 312721 REV D
SCALE NONE SHEET 1 OF 12

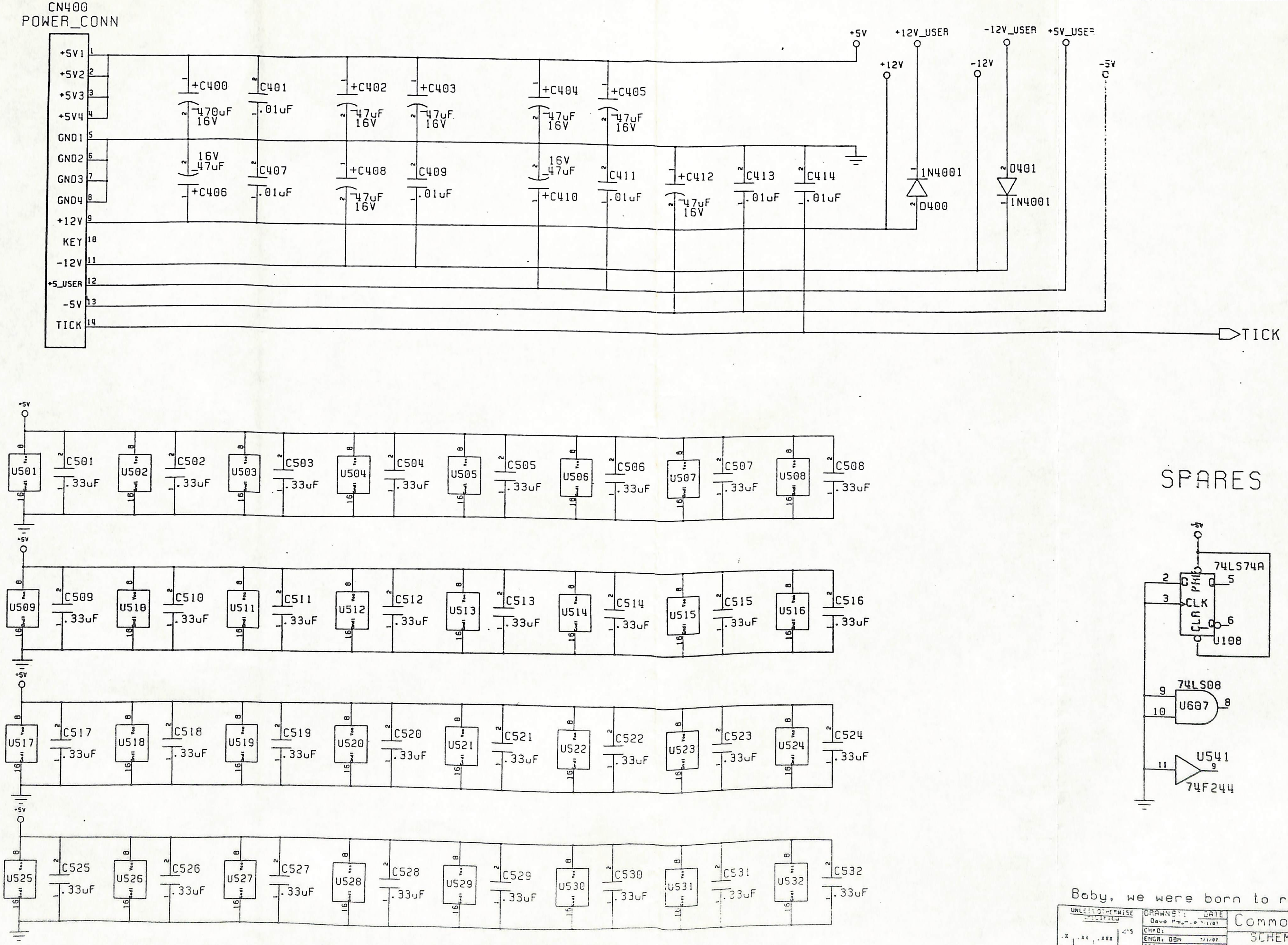

REVISIONS
DESCRIPTION
SEE COVER SHEET
+5V
R200
+AUD
470uF
16v
C225
.1uF
C208
U200
PAULA
DRD(0:15)
RGA(1:8)
_CIPL(0:2)
DMAL
C1
C3
_RST
_DKRD
_DKWD
DKWE
_RxD
_TxD
_INT6
_INT3
_INT2
LEFT
RIGHT
C210
C211
C212
C213
.047uF
AUDIO
R240
360
U204
LF347
Vref
C241
6800pF
R241
10K
R242
C242
3900pF
MPF102
Q200
R204
470K
22uF
16v
C243
R243
1K
LEFT AUDIO
CN205
RCA JACK
.1uF
C244
390
R244
FLTLEFT
AUDOUT
RAWLEFT
R202
10K
AUDIN
RAWRIGHT
FLTRIGHT
RIGHT AUDIO
CN204
R230
C231
R231
R232
C232
Q201
R205
C233
R233
C234
R234
FB401
FB
+AV
R213
2.7K
R214
Q202
2N3906
_CUTOFF
.01uF
C204
R206
-AV
+5V_USER
C218
FB215
RIGHT(1)
DB9P
CN200
RP200
4.7K (P+9)
R900
74LS157
U202
_MC1
MIV
MIH
MOV
MOH
68 (D×4)
RP204
FORWARD
BACK
LEFT
RIGHT
FIRE
DGND
POTY
POTX
FB201
FB202
FB203
FB204
C245
C246
C247
C248
100pF
FB209
FB210
FB211
C250
C251
C249
LEFT(0)
CN201
FB205
FB206
FB207
FB208
C252
C253
C254
C255
FB212
FB213
FB214
C257
C258
C256
_FIR0
A1000
OLD
_LPEN
J200
A500
STANDARD
_FIR1
C202
R209
1.2K
Vref
R210
C219
.22uF
C224
4.7uF
16v
+12V
R207
10
C220
C222
47uF
C221
C223
R208
-12V
C900
C901
I'n pickin' up good vibrations...
Commodore
SCHEMATIC
A2000CR
312721
SCALE NONE
SHEET 2



He never could adjust to land.
although he tried so hard.

Commodore
SCHEMATIC
A2000CR
SIZE C 312721 D
SCALE NONE SHEET 3 OF

ZONE	LTR	DESCRIPTION	DATE	APPROVED
		SEE COVER SHEET		

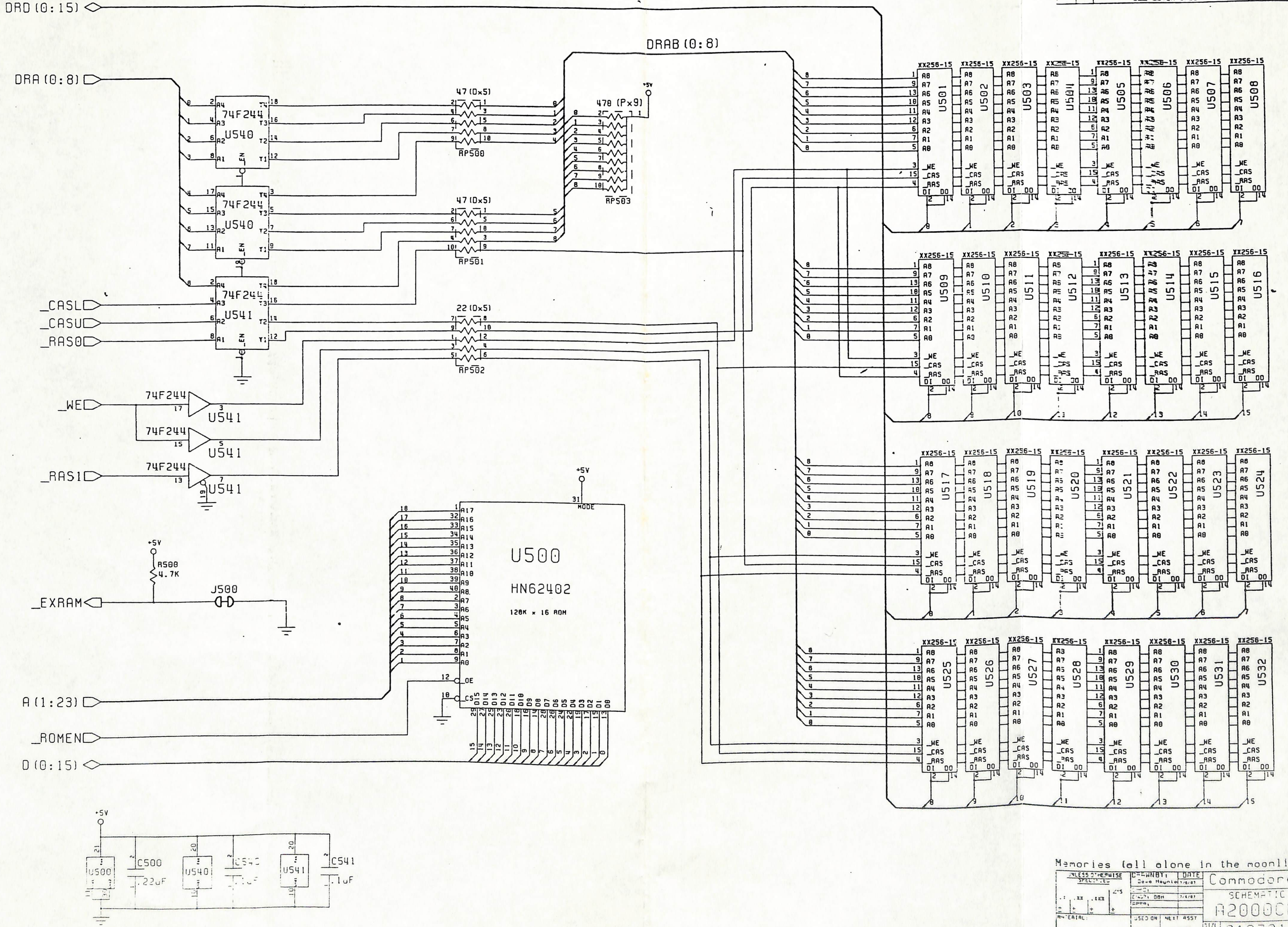


C525-C532 not in United States version

Baby, we were born to run...

UNLESS OTHERWISE SPECIFIED .X ± .XX ± .XXX ± ∠'S ±	DRAWN BY: Dave Haynie DATE 7/1/87 CHKD: ENGR: DBM 7/1/87 APPR:	Commodore
MATERIAL:	USED ON: A2000-CR NEXT ASST 312725	SCHEMATIC A2000CR
FINISH:		SIZE C 312721 REV D SCALE NONE SHEET 4 OF 12

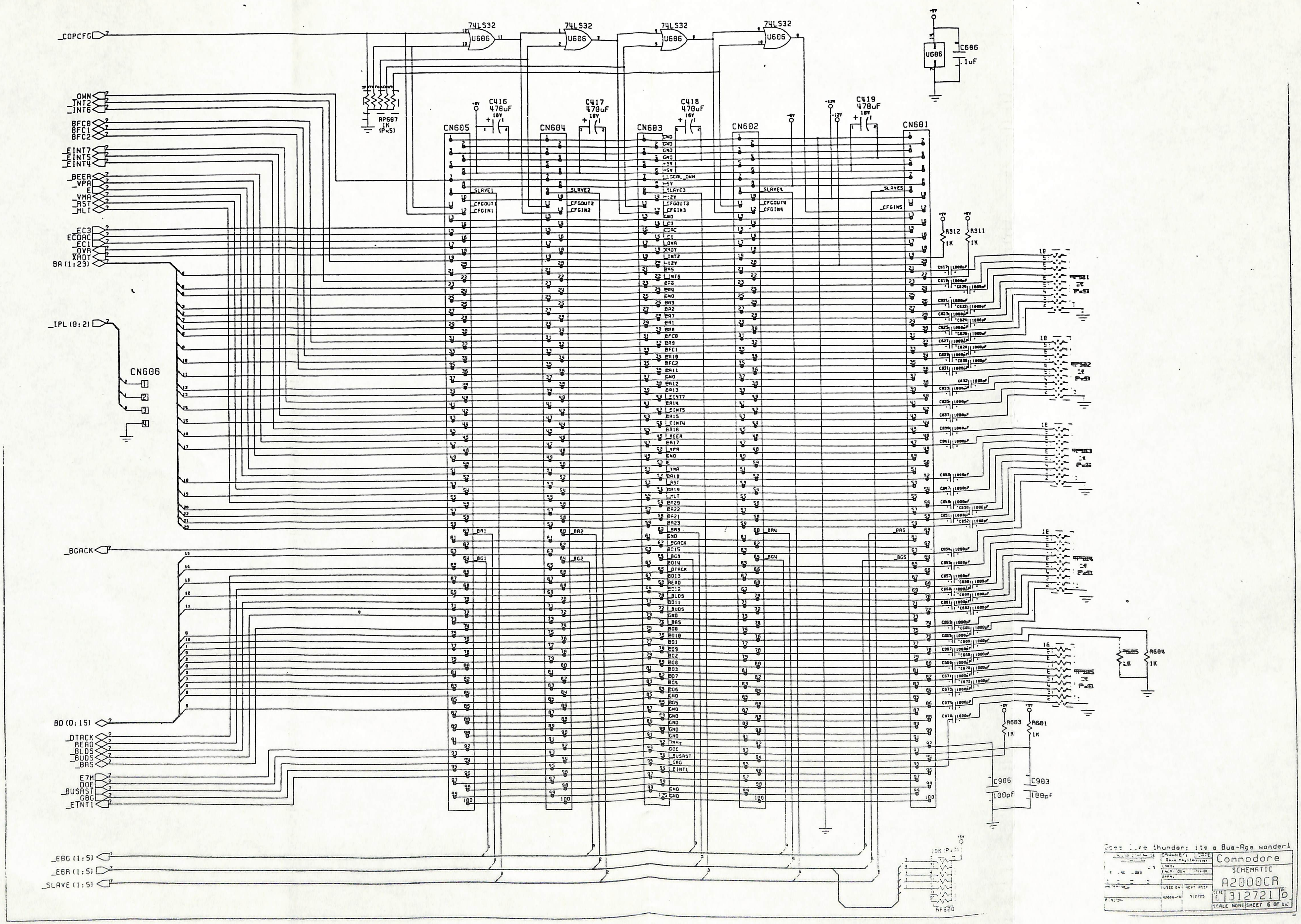
REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
		SEE COVER SHEET		



Memories (all alone in the moonlight!)

UNLESS OTHERWISE SPECIFIED	DRAWN BY:	DATE	Commodore
.X .XX .XXX ANG'S ± ± ± ±	Dave Haynie	7/8/87	SCHEMATIC
	CHKD:		A2000CR
	ENGR: DBH	7/4/87	
	APPR:		
MATERIAL:	USED ON A2000-CR	NEXT ASSY 312725	SIZE C 312721 REV D
FINISH:			SCALE NONE SHEET 5 OF 12

REVISIONS			
ZONE LTR	DESCRIPTION	DATE	APPROVED
	SEE COVER SHEET		



Goes like thunder; its a Bus-Age wonder!

Commodore

SCHEMATIC

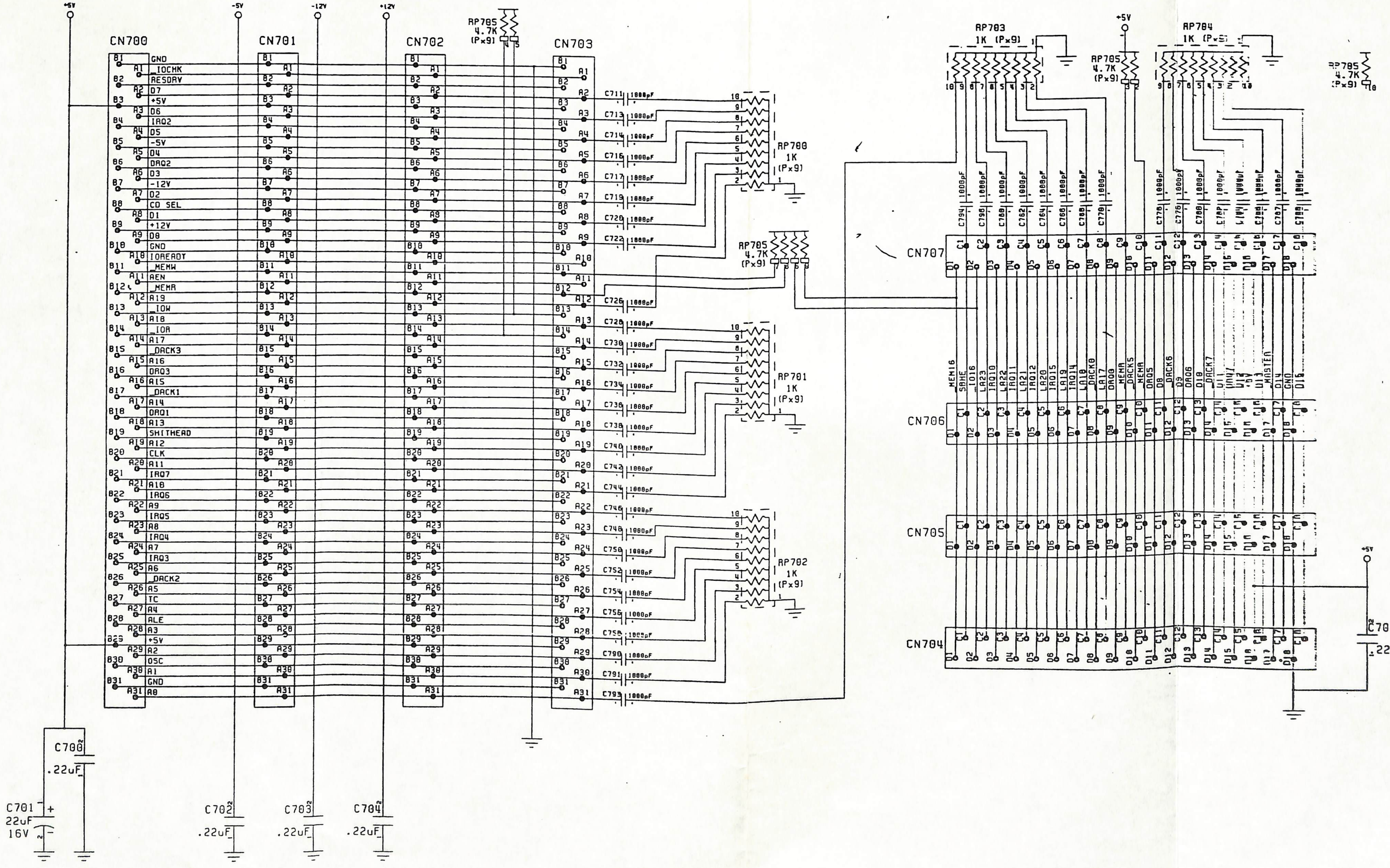
A2000CR

DRAWN BY: Dave Haynie
USED ON A2000-CR
NEXT ASSY 312725
SIZE C 312721 REV D
SCALE NONE SHEET 6 OF 1[illegible]

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	1	SEE COVER SHEET		

IBM 8 BIT EXPANSION BUS

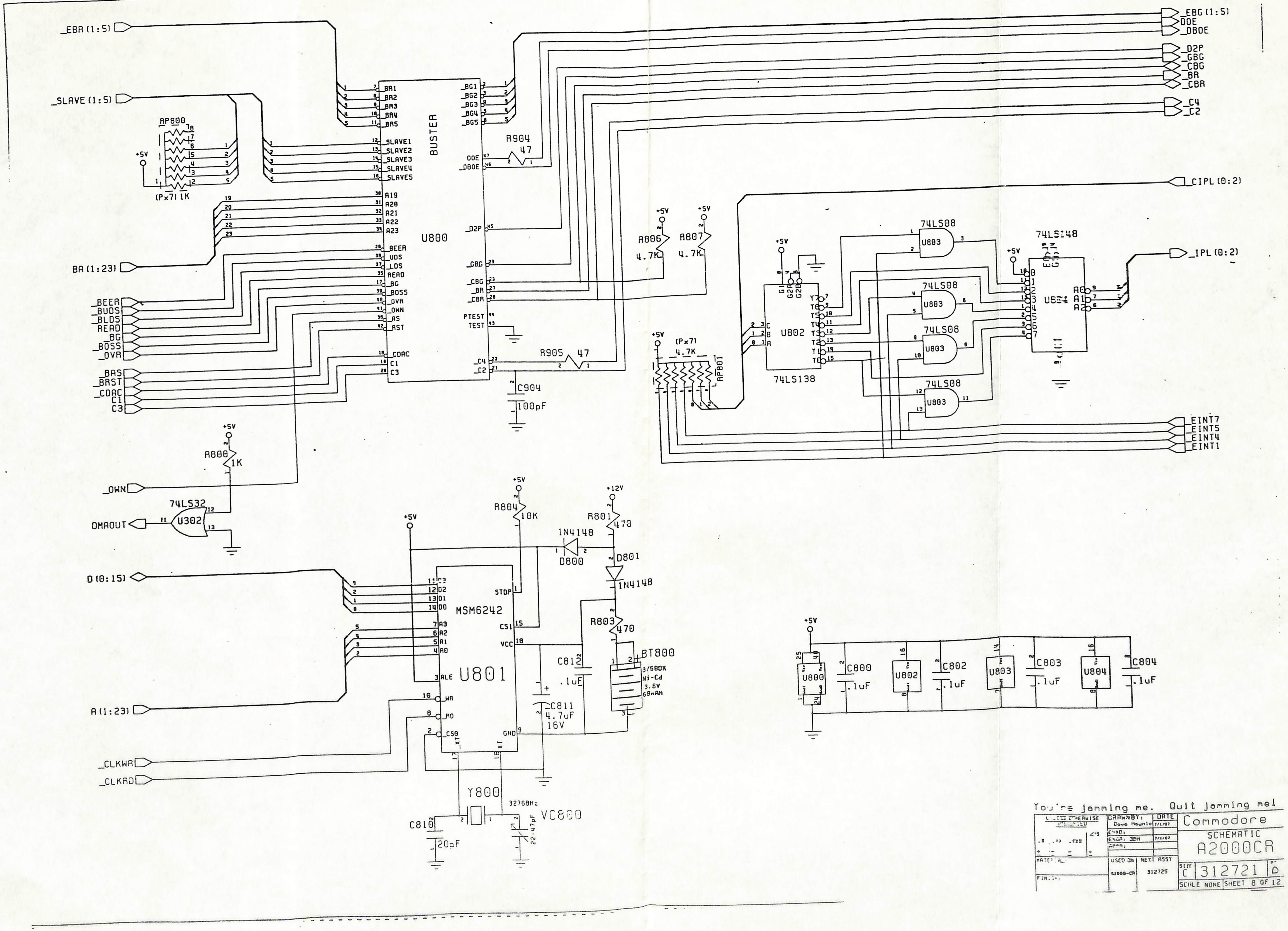
IBM 16 BIT EXTENDED BUS



I wait in this place,
where the sun never shines

UNLESS OTHERWISE SPECIFIED
DRAWN: Dave Haynie 7/1/87
CHKD.
ENGR. DBM 7/1/87
APPD.
MATERIAL:
FINISH:
USED ON | NEXT ASST
312725
Commodore
SCHEMATIC
A2000CR
SIZE C | 312721 | REV D
SCALE NONE | SHEET 7 OF 12

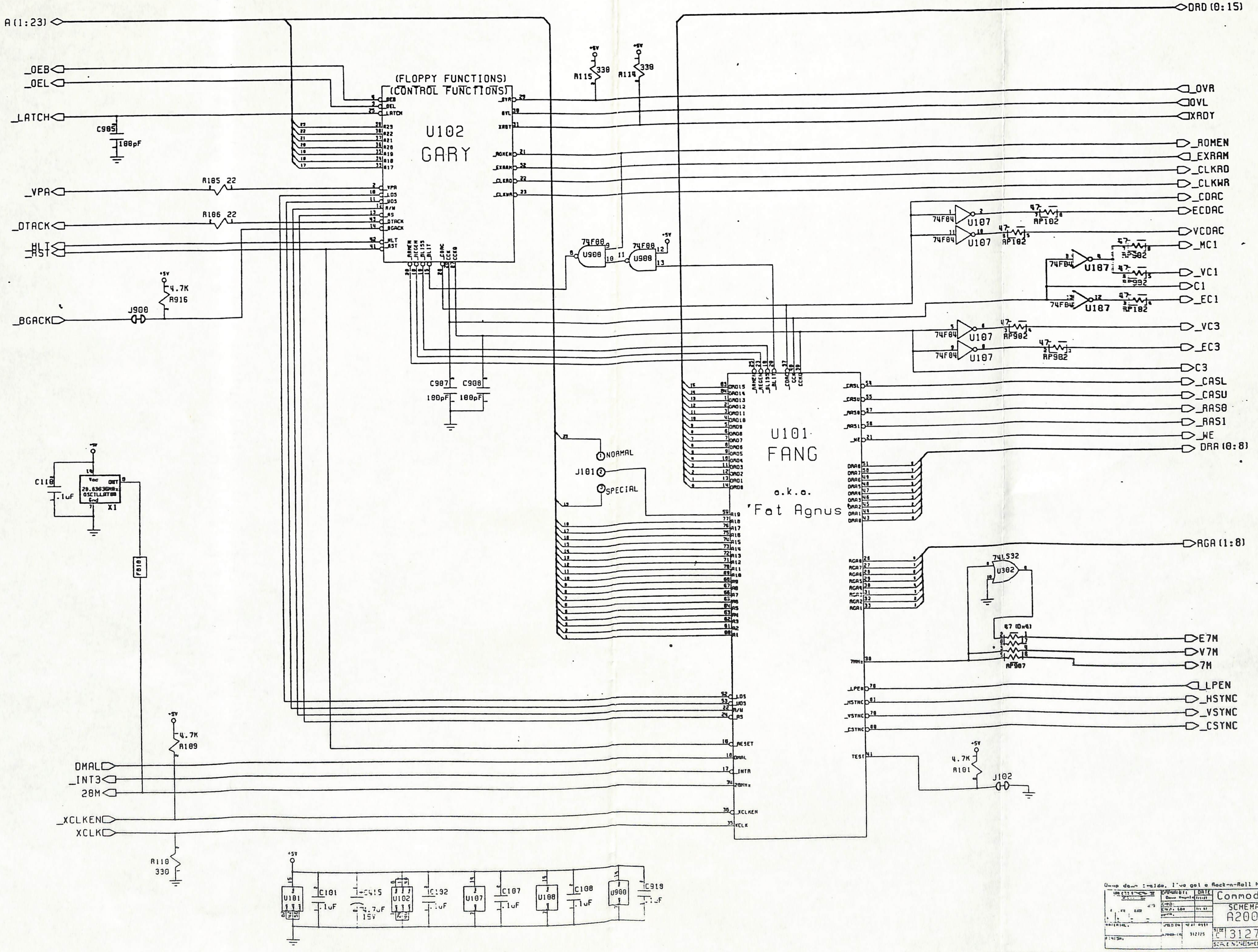
ZONE	LTR.	DESCRIPTION	DATE	APPROVED
		SEE COVER SHEET		



You're jamming me. Quit jamming me!

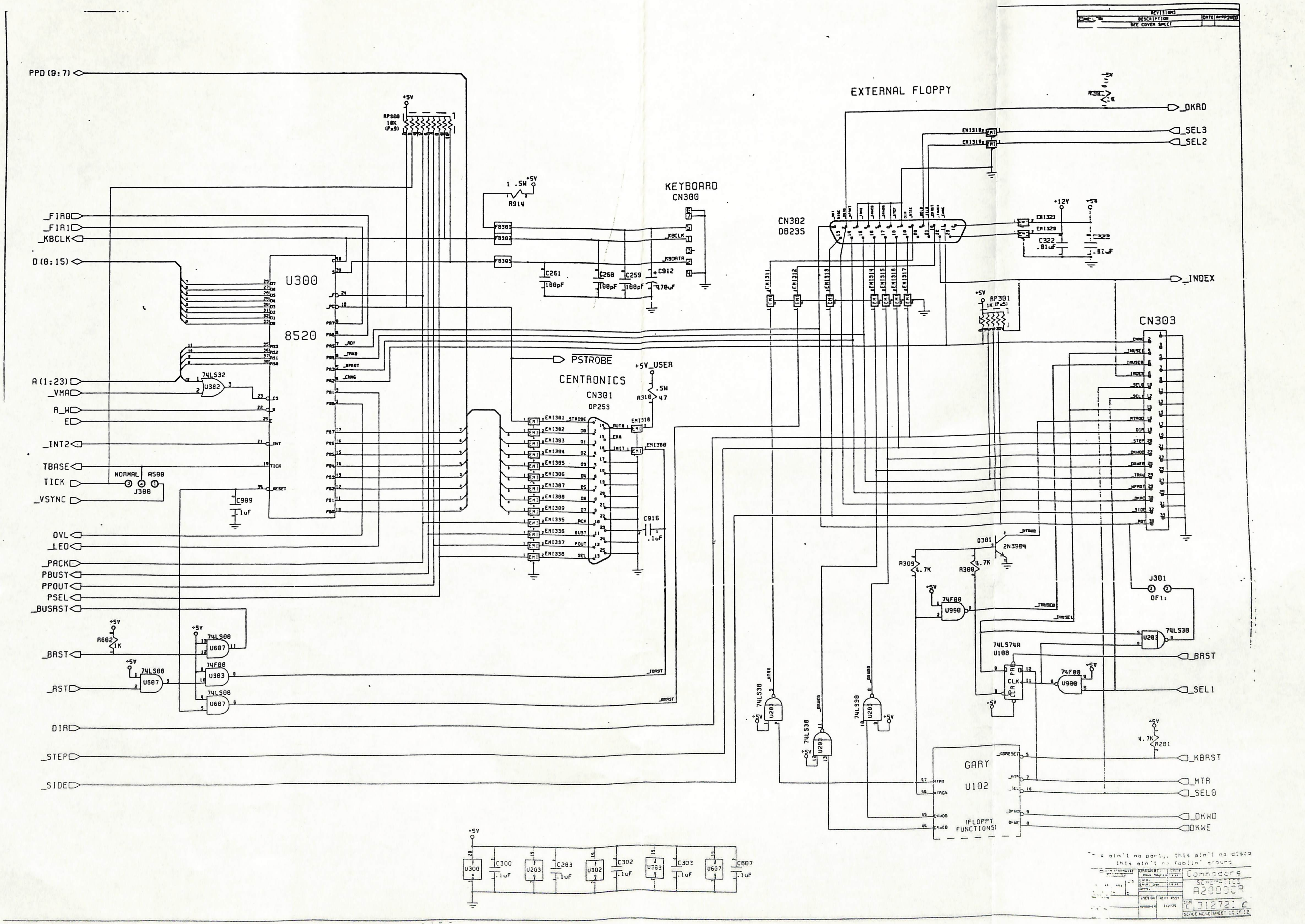
UNLESS OTHERWISE SPECIFIED	DRAWN BY: Dave Haynie	DATE 7/1/87	Commodore
	CHKD:		SCHEMATIC A2000CR
	ENGR: JEH	7/1/87	
	APPR:		
MATERIAL:	USED ON A2000-CR	NEXT ASSY 312725	SIZE C 312721 R D
FINISH:			SCALE NONE SHEET 8 OF 12

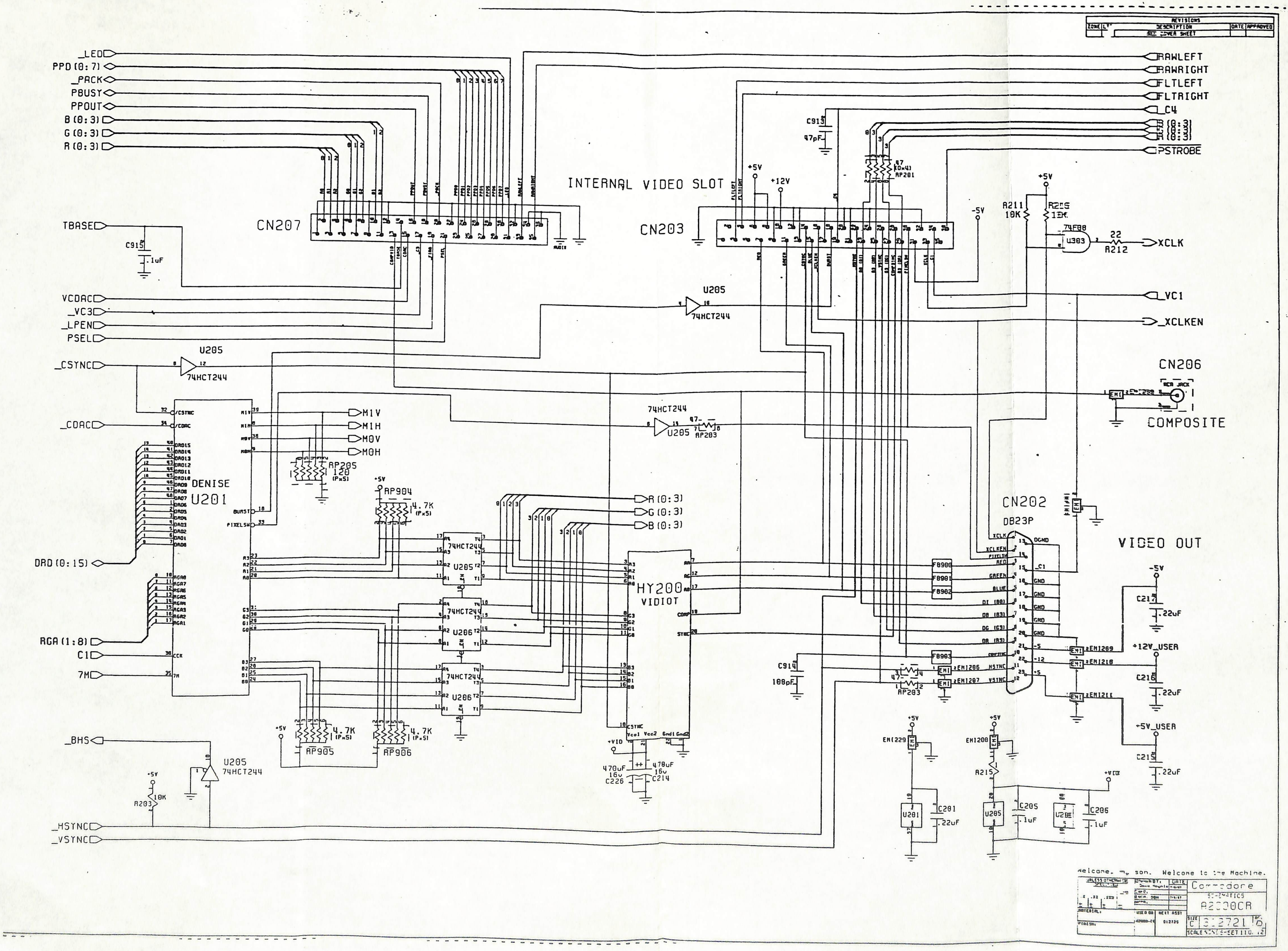
REVISIONS
DESCRIPTION | DATE | APPROVED
SEE COVER SHEET

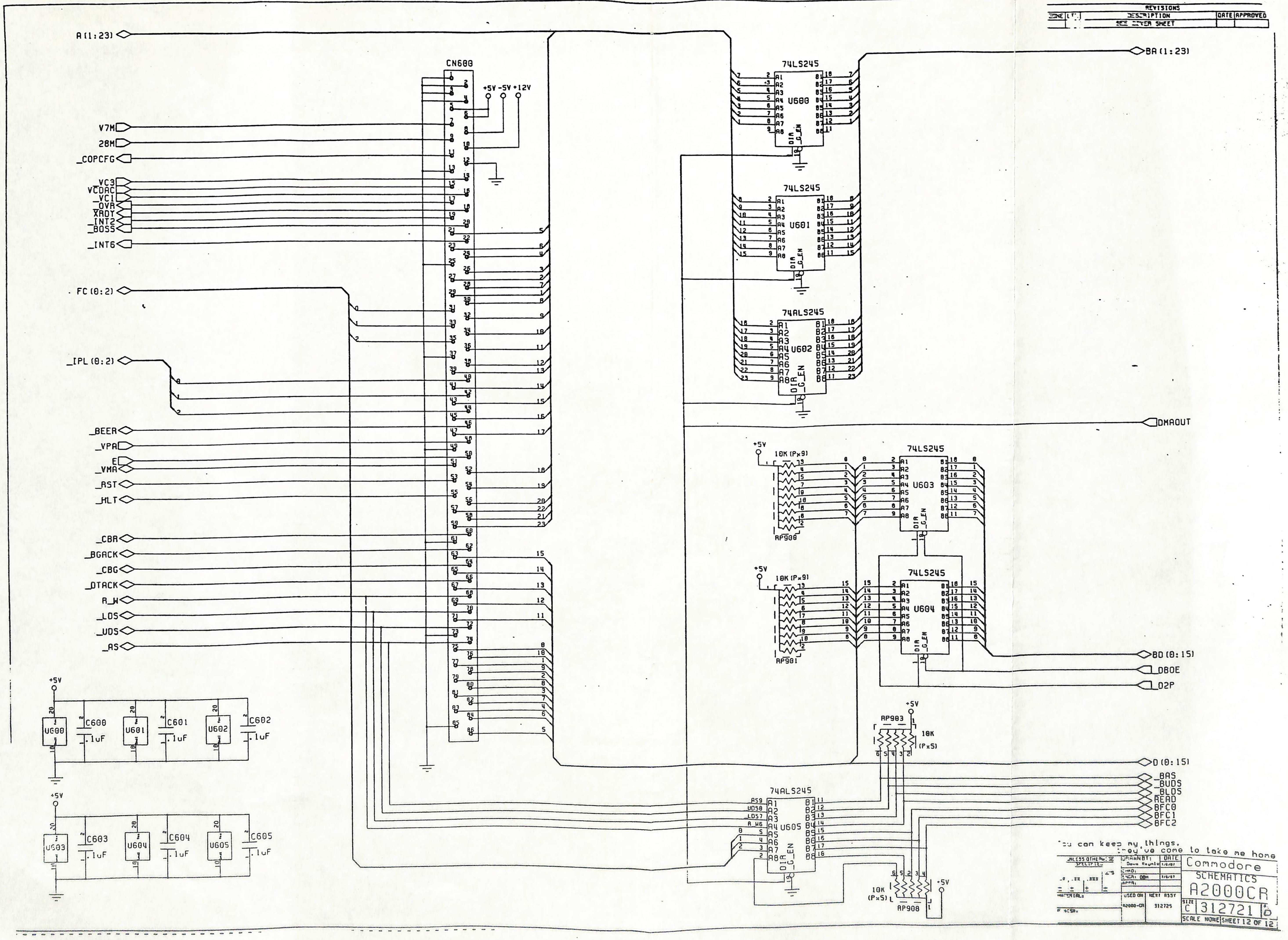


Deep down inside, I've got a Rock-n-Roll heart

Commodore
SCHEMATICS
A2000CR
SIZE C 312721 D
SCALE NONE SHEET 9 OF 12


REVISIONS
DESCRIPTION
SEE COVER SHEET
DATE
APPROVED
PPD(0:7)
_FIR0
_FIR1
_KBCLK
D(0:15)
A(1:23)
_VMA
R_W
E
_INT2
TBASE
TICK
_VSYNC
OVL
_LED
_PACK
PBUSY
PPOUT
PSEL
_BUSRST
_BRST
_RST
DIR
_STEP
_SIDE
RP300 10K (Px9)
+5V
U300
8520
74LS32
U302
NORMAL
A500
J300
C909 .1uF
1 .5W
A914
FB301
FB302
FB303
C261 100pF
C260 100pF
C259 100pF
C912 470uF
KEYBOARD
CN300
_KBCLK
_KBDATA
PSTROBE
CENTRONICS
CN301
DP25S
+5V_USER
A318 .5W 47
EMI301
EMI302
EMI303
EMI304
EMI305
EMI306
EMI307
EMI308
EMI309
EMI335
EMI336
EMI337
EMI338
EMI318
EMI380
STROBE
D0
D1
D2
D3
D4
D5
D6
D7
ACK
BUSY
POUT
SEL
AUTO
ERR
INIT
C916 .1uF
74LS08
U607
74F08
U303
EXTERNAL FLOPPY
_DKRD
_SEL3
_SEL2
EMI319
EMI320
CN302
DB23S
+12V
EMI321
EMI329
C322 .01uF
.01uF
_INDEX
EMI311
EMI312
EMI313
EMI314
EMI315
EMI316
EMI317
RP301 1K (Px5)
CN303
CHNG
_INUSE
INDEX
SEL
MTRO
DIR
STEP
DKWDB
DKWEB
TRK0
WPROT
DKRD
SIDE
RST
Q301
2N3904
R309 4.7K
R308 4.7K
J301
OF1
74F08
U900
_INUSE
74LS74A
U100
PR
CLK
CLR
74LS38
U203
_BRST
_SEL1
74LS38
U201
_MTR
_DKWEB
_DKWDB
GARY
U102
(FLOPPY FUNCTIONS)
_KBRESET
MTR
SEL
DKWD
DKWE
4.7K
A201
_KBRST
_MTR
_SEL0
_DKWD
_DKWE
U300
C300 .1uF
U203
C203 .1uF
U302
C302 .1uF
U303
C303 .1uF
U607
C607 .1uF
this ain't no party, this ain't no disco
this ain't no foolin' around
DRAWN BY
DATE
Commodore
SCHEMATICS
A2000CR
SIZE C
312721 C
SCALE NONE
SHEET


REVISIONS
ZONE
LT
DESCRIPTION
DATE
APPROVED
SEE COVER SHEET
_LED
PPD(0:7)
_PACK
PBUSY
PPOUT
B(0:3)
G(0:3)
R(0:3)
TBASE
C915
.1uF
CN207
VCDAC
_VC3
_LPEN
PSEL
_CSYNC
U205
74HCT244
_CDAC
DRD(0:15)
DENISE
U201
M1V
M1H
M0V
M0H
RP205
120
RP904
4.7K
R(0:3)
G(0:3)
B(0:3)
RGA(1:8)
C1
7M
74HCT244
U205
U206
HY200
VIDIOT
RP905
RP906
_BHS
R203
10K
_HSYNC
_VSYNC
INTERNAL VIDEO SLOT
CN203
+5V
+12V
C913
47pF
RP201
RAWLEFT
RAWRIGHT
FLTLEFT
FLTRIGHT
_C4
PSTROBE
R211
10K
R205
10K
74F08
U303
22
R212
XCLK
-5V
_VC1
_XCLKEN
CN206
RCA JACK
COMPOSITE
47
RP203
CN202
DB23P
VIDEO OUT
FB900
FB901
FB902
FB903
C914
100pF
EMI206
EMI207
EMI209
EMI210
EMI211
C217
.22uF
+12V_USER
C216
.22uF
+5V_USER
C215
.22uF
+VID
470uF
16v
C226
470uF
16v
C214
EMI229
EMI208
R215
U201
C201
.22uF
U205
C205
.1uF
U206
C206
.1uF
Welcome, my son. Welcome to the Machine.
UNLESS OTHERWISE SPECIFIED
DRAWN BY:
DATE
MATERIAL:
FINISH:
USED ON
NEXT ASSY
A2000-CR
012726
Commodore
SCHEMATICS
A2000CR
SIZE
C
312721
REV.
SCALE NONE
SHEET NO. 2



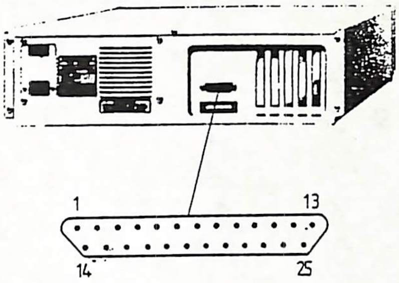
		REVISIONS		
ZONE	LTR	DESCRIPTION	DATE	APPROVED
		SEE COVER SHEET		

You can keep my things,
they've come to take me home

UNLESS OTHERWISE SPECIFIED	DRAWN BY: Dave Haynie	DATE 1/8/87	Commodore	
	CHKD:		SCHEMATICS	
.X .XX .XXX	ENGR: DDM	1/8/87	A2000CR	
± ± ± ±	APPR:			
MATERIAL	USED ON A2000-CR	NEXT ASSY 312725	SIZE C	312721	D
			SCALE NONE	SHEET 12 OF 12

4.0 PC10 RS232 INTERFACE CONNECTIONS

The PC10 RS232 interface connections have been provided for your information so that testing of the RS232 port on the PC can be effected using peripheral devices such as printers and modems. You will need to construct your own interconnecting cable.



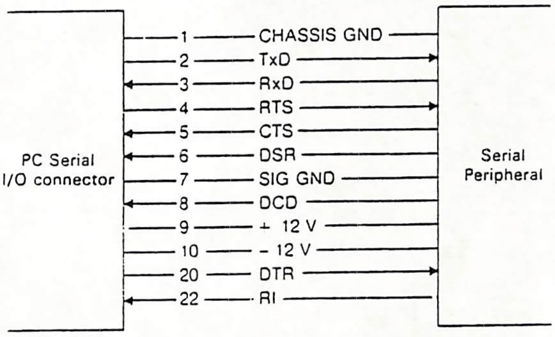


Fig. 1.20 Serial interface connections

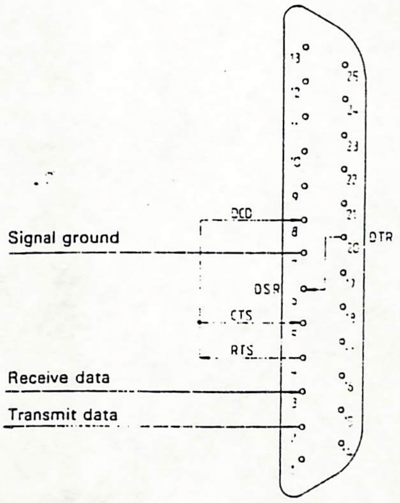
PC Hardware

The RS-232C interface signals and power pins are as follows:-

Signal	Direct-ion	Pin No.	Function
CH. GND		1	Chassis or Frame ground
TxD	Out	2	Transmit Data Tx data from PC to peripheral.
RxD	In	3	Receive Data Rx data from peripheral to PC.
RTS	Out	4	Request To Send Request to send data to peripheral.
CTS	In	5	Clear To Send Peripheral is ready to receive.
DSR	In	6	Data Set Ready Indicates peripheral ready for use.
SIG. GND		7	Signal ground
DCD	In	8	Data Carrier Detect Shows that a connected modem receives a carrier.
+12v		9	Power output.
-12v		10	Power output.
DTR	Out	20	Data Terminal Ready Shows to peripheral PC ready for use.
RI	In	22	Ring Indicator Indicates to PC that modem has received a ringing signal.

Recommended minimum connection interface.

This uses three lines (Rx, Tx, and GND) for the connection. The remaining signals are strapped as shown in Fig. 1.21.



25 pin D-type male connector

Fig. 1.21 Example of minimum RS-232C connection.

5.0 PC REPAIR TIPS

5.1 PC parity errors

The PC uses a ninth bit to determine parity. If a byte contains an even number of "1" bits, then a "1" will be generated in the parity bit. IF the byte contains an odd number of "1" bits, then a "0" will be generated in the parity bit. The system maintains this "odd parity" to ensure that data has not been corrupted during data transfers.

1. Check U30: This is where the parity or ninth bit is stored.
2. Check U9: Ram expansion board, up to 512 Kb; check U10 & U11 for 640 Kb.
3. Check U1: Pins 5 and 6 for PCK and logical NOT PCK. Also check P logical NOT CLR.
4. Check U9: Pins 5 and 15 (buffer) may give false value back on DB3. this chip is bad a message of "unexpected switch interrupt" will occur and may alter signal sent from U20 (switch settings).
5. Check signal from U8 pin 12 to U2 pin 11, out pin 10, ENRAMPCK.

5.2 Compute effective address

Under certain error conditions an address will be displayed on the screen indicating where in memory a problem has occureed.

The address is expressed in the formof register contents.

Example: CS:IP = 83AB:1010 where CS, the segment register contains Hex where IP, the instruction pointer contains He 1010.

To compute the effective address, shift the contenets of the segment register 4 bits to the left and then add.

Example: Shift left 4 bits CS = 83AB0
Add IP = 1010
Effective 20 bit address 84AC0

Note: This byte holds two (2) hex digits

5.3 BIOS self test diagnostics

BIOS SELF TEST DIAGNOSTICS.

The Commodore PC carries out a number of self checks when it is switched on. When all the tests are completed satisfactorily the PC will boot the MS-DOS operating system. Failure of a test that is essential to the operation of the PC results in the output of an error code and a system halt. Failure of non essential functions result in the output of an error code but the system continues with the test.

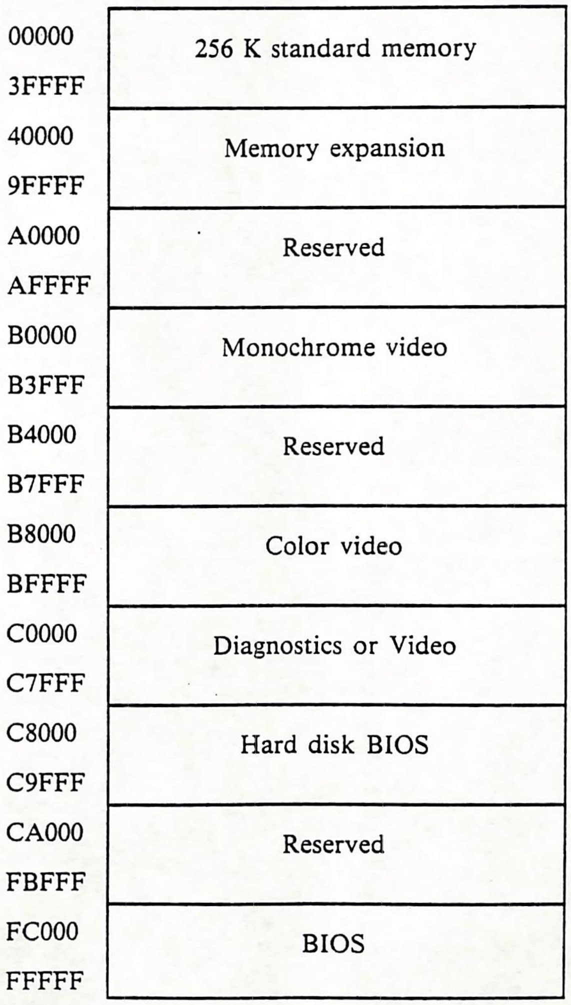
All errors below 62 (hex) are fatal system errors and cause a system halt. Errors above 61 (hex) are treated as warnings so power up continues. DIP switch 1 on the system board is used to loop the diagnostic tests (see error code FF).

The various diagnostic tests are as follows:

ERROR CODE	**TEST** **CAUSE OF ERROR**
00	CPU/SYSTEM BUS This error occurs if the CPU is faulty, or the system bus is bad (data, addr. etc.), or the ROM is faulty. Action: system HALT.
10	TIMER 0,1 Occurs if Timer outputs 0 or 1 are too slow or too fast. Action: system HALT.
20	SYSTEM PORT, TIMER 2 System port (61H) does not store control bits or timer 2 cannot be controlled (GATE 2, OUTPUT 2). Action: system HALT.
30	ROM CHECKSUM BAD The BIOS ROM does not checksum to 00. The ROM itself is faulty, or the address logic, or the data bus is bad. Action: system HALT.
40	DMA CONTROLLER R/W ERROR Registers of the DMA controller do not store parameters. Action: system HALT.
50	PROGRAMMABLE INTERRUPT CONTROLLER Interrupt controller does not respond to timer interrupt. Action: system HALT.
60	ADDRESS FAILURE All locations up to 640 K (if present) are filled with address dependent contents and then afterwards read back and checked. Faults in address decoding will cause a write to one location to destroy other locations. Action: system HALT.
61	BASE RAM A R/W storage failure in the lower 16 K RAM. Action: system HALT.
62	MAIN RAM R/W storage failure in the RAM size specified by DIP switches 3 and 4. Either the RAM is bad or the DIP switches reflect the wrong RAM size. Action: Print RAM segment in error followed by the bit pattern (e.g. AA or 55) or 00 (for parity error) followed by the words RAM. Memory size is adjusted downwards.
80	VIDEO RAM R/W storage failure in the video RAM section. As set by DIP switches. Action: Issue one long and two short beeps.
81	VIDEO RETRACE No video signal found or retrace pulses missing. Action: Issue one long and two short beeps.
A0	KEYBOARD No keyboard present, or key struck, or bad keyboard. Action: Print scan code of stuck key (if any) followed by the word KEY.
C1	ROM SEARCH 1 An extension ROM at C0000 to C7FFF (hex) is found with a bad checksum. Action: Issue two short and one long beep. Print segment of ROM on screen followed by the word ROM.
C2	ROM SEARCH 2 - HD BIOS An extension ROM at C8000 to EFFFF (hex) is found with a bad checksum. Indicates ROM on HD controller failure. Action: Issue two short and one long beep. Print segment of ROM on screen followed by the word ROM.

5.4 PC memory map

Usage	Address	Size
00000-003FF	1K	Interrupt vectors
00400-004FF	256	BIOS/DOS data area
00500-3FFFF	255K	DOS/User RAM
40000-7FFFF	256K	User RAM
80000-9FFFF	128K	User RAM
A0000-AFFFF	64K	Reserved
B0000-B0FFF	4K	Monochrome video RAM
B1000-B3FFF	12K	Additional monochrome video RAM
B4000-B7FFF	16K	Reserved
B8000-BFFFF	32K	Color video RAM
C0000-C7FFF	32K	Reserved (diagnostics or video ROM)
C8000-C9FFF	8K	Hard disk BIOS (on controller card)
CA000-FBFFF	200K	Reserved
FC000-FFFFF	16K	BIOS ROM (version 1D is only 8K)



6.0 Amiga 2088 Bridgeboard Users Guide

Some Commcare Centres have experienced difficulty with Amigas and the 2088 Bridgeboard. The problem has been in understanding how to use the Amiga with the Bridgeboard installed. Commcare Centres wishing a copy of the Amiga 2088 Bridgeboard Users' Guide should order the manual through usual channels as a non-warranty part order.

7.0 NEW PRODUCTS

This section is provided to inform Commcare Centres of new products being released. The following four pages contain a description of:

1. Pro Pack Plus
2. Amiga 500 Pack
3. AmigaDos Training Tapes

The AmigaDos training tapes are recommended for Commcare Centres who wish to ma their staff aware of Amiga harware and the Amiga operatihg system, without having to travel to Commodore to attend an elementary training course.

PRO PACK PLUS

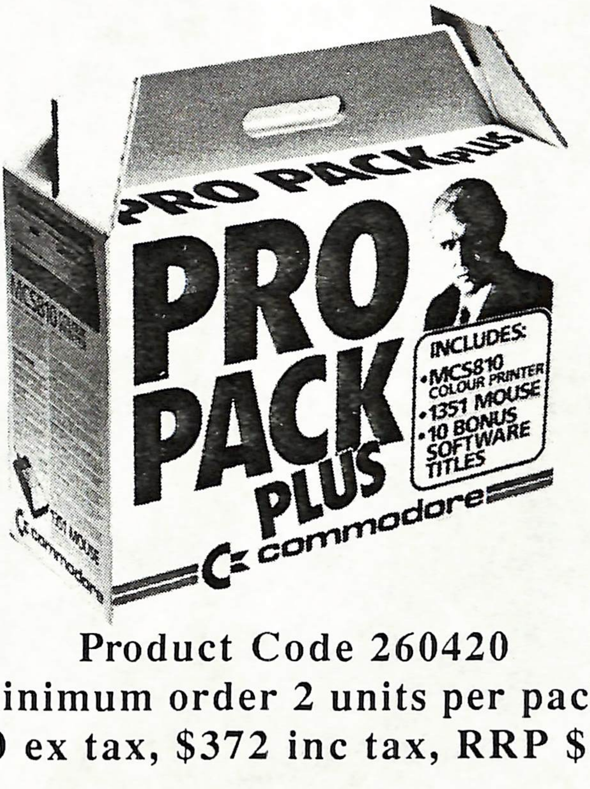
This pack will make an ideal add-on sell to the Pro Pack. The Pro Pack Plus will be available during May.

It is sold separately to the Pro Pack.

The Pro Pack Plus contains :-

- MCS 810 Colour Printer
- 1351 Mouse
- 10 Software Programs on disk

Recommended Retail Price of the Pro Pack Plus is $499



Product Code 260420
Minimum order 2 units per pack.
$310 ex tax, $372 inc tax, RRP $499.

AMIGA 500 PACK

The *new* Commodore Amiga 500 Pack
is the complete solution for home, education and
small business and will be available during May.

The Amiga 500 Pack contains :-

- Amiga 500 Personal Computer
- A520 RF Modulator
- Textcraft Plus (wordprocessing software)

If the contents were sold separately,
they would have a retail value of $1,157.00.

Recommended Retail Price of the Amiga 500 Pack is $999.

ORDER
NOW

Product Code 170530
Minimum order 2 units per pack.
$675 ex tax, $810 inc tax, RRP $999.

AMIGADOS TRAINING TAPES

INTRODUCTION

The AmigaDOS Training Tapes consist of two double sided audio tapes and an instruction manual. The tapes introduce the user to the Amiga's hardware and operating system. The manual provides detailed diagrams of the Amiga hardware to make setup and connection easy. As mentioned above the training tapes are double sided so in fact there are four different lessons. The AmigaDOS tapes are an invaluable tool for the first time Amiga user as they give you an introduction to the Amiga's hardware and software as well as getting you up and running within minutes. The tapes are also useful to the computer expert as they give you an understanding of the unique way in which the Amiga operates. The following is a brief explanation of each of the four training lessons:–

LESSON 1:

Lesson 1 gives the Amiga user an introduction to the Amiga hardware and peripherals such as the monitor, mouse, and printer. It helps you to set up and connect your Amiga computer and how to use the diskettes provided to "boot" your system. You are instructed on using the mouse and guiding the pointer around the screen as well as manipulating the different icons or programs that you may wish to run. Lesson 1 also gives invaluable lessons in copying and naming disks which is one of the most important functions when using a computer. It gives you an understanding of how menus work on the Amiga and how to "reboot" your system when the lesson is completed.

LESSON 2:

Lesson 2 introduces you to the Amiga Preferences option and allows you to set the date and time and set up your Amiga for use with a printer. This lesson also teaches the operator how to format and name diskettes, a very important part of operating a computer. The Amiga's windowing techniques are explained and you will learn how to move, resize and close windows. You are able to type a document into the Amiga's notepad and use the Amiga's calculator.

LESSON 3:

Lesson 3 allows the operator to move files to different directories and delete files. It will take you into the SAY command where you may type text into the program and the Amiga will repeat it back to you demonstrating the Amiga's text-to-speech capability. With this lesson you will enjoy creating your own icons and you may save these icons and use later to select the program you wish to run.

Continued ...

AMIGADOS TRAINING TAPES

LESSON 4:

Lesson 4 takes the operator further into the Amiga's operating system by using the CLI (Command Line Interface) which is the area in which the operator interacts with the computer via the keyboard rather than the mouse. This lesson takes you through some of the commonly used AmigaDOS commands and utilities such as Diskcopy, Directory, List, Date, CD, and Copy. Lesson 4 also gives you an understanding of the Amiga's unique multitasking capabilities.

APPLICABILITY:

Remember that with these tapes you may pause at any time and experiment with a particular option that interests you. There is no pressure or time limit so the operator may set their own pace.

The AmigaDOS Training Tapes have been designed purely as an introduction to the Amiga and its operating system. For further information on training for the Amiga we suggest you contact Commodore Computers, Commtrain Department on (02) 427.4888 for details on the training courses available for the Amiga.

PRODUCT CODE : 560060

DEALER COST : EX TAX - $62.50

R.R.P. : $99.00

8.0 SERVICE MANUAL LIST

****
SPARE PARTS LIST
MANUAL
****

CODE	ITEM DESCRIPTIONS	VENDOR P/N	D.P.	C.P.	R.R.P.
913539	DIAG MANUAL 1571/C128D		18.00	16.00	27.00
913507	SERVICE MANUAL 1515/1525		25.00	25.00	25.00
913514	SERVICE MANUAL 1526 PRINTER		30.00	30.00	30.00
913515	SERVICE MANUAL 1530/1531 D/S		10.00	10.00	10.00
913505	SERVICE MANUAL 1540/1541 DD		35.00	35.00	35.00
913536	SERVICE MANUAL 1541-II DD		13.00	10.00	18.00
913512	SERVICE MANUAL 1701/1702 MON		25.00	25.00	25.00
913534	SERVICE MANUAL 1802 MONITOR		13.00	10.00	18.00
913513	SERVICE MANUAL 1901 MONITOR		25.00	25.00	25.00
913508	SERVICE MANUAL 2022/2023		25.00	25.00	25.00
913506	SERVICE MANUAL 2031LP		30.00	30.00	30.00
913501	SERVICE MANUAL 4016/4032 COMPU		50.00	50.00	50.00
913510	SERVICE MANUAL 4022 PRINTER		35.00	35.00	35.00
913509	SERVICE MANUAL 6400		70.00	70.00	70.00
913525	SERVICE MANUAL 64K ADD ON BD		11.00	9.62	16.50
913500	SERVICE MANUAL 8032 COMPUTER		50.00	50.00	50.00
913511	SERVICE MANUAL 8032 COMPUTER		35.00	35.00	35.00
913504	SERVICE MANUAL 9060/9090 HD		70.00	70.00	70.00
913527	SERVICE MANUAL A1000 COMPUTER		20.00	15.00	30.00
913538	SERVICE MANUAL A2000 COMP		23.00	20.00	32.00
913530	SERVICE MANUAL A500 COMPUTER		17.82	15.59	26.73
913526	SERVICE MANUAL B500/B700		10.18	8.91	15.27
913524	SERVICE MANUAL C128 COMPUTER		45.00	38.00	67.00
913533	SERVICE MANUAL C128D COMPUTER		13.00	10.00	18.00
913521	SERVICE MANUAL C16 COMPUTER		11.45	9.16	17.18
913502	SERVICE MANUAL C64 COMPUTER		10.00	10.00	10.00
913535	SERVICE MANUAL C64C COMPUTER		13.00	10.00	18.00
913519	SERVICE MANUAL MCS801 PRINTER		17.60	15.40	26.40
913532	SERVICE MANUAL MCS810/820 PR		30.00	25.00	38.00
913518	SERVICE MANUAL MPS1101 PRINTER		35.00	35.00	35.00
913528	SERVICE MANUAL MPS1200		17.82	15.59	26.73
913531	SERVICE MANUAL MPS2020 PRINTER		80.00	70.00	100.00
913516	SERVICE MANUAL MPS801 PRINTER		30.00	30.00	30.00
913517	SERVICE MANUAL MPS803 PRINTER		30.00	30.00	30.00
913537	SERVICE MANUAL PC-III		13.00	10.00	18.00
913522	SERVICE MANUAL PLUS4 COMPUTER		11.45	9.16	17.18
913523	SERVICE MANUAL SX64 COMPUTER		8.90	7.12	13.35
913503	SERVICE MANUAL VIC20 COMPUTER		10.00	10.00	10.00
913529	TECHNICAL MANUAL PC40	314134-01	120.00	120.00	160.00

END OF LIST

9.0 SAMPLE TECHNICAL SERVICE BULLETIN

The attached Technical Service Bulletin is presented for perusal by all Commcare Centres. The purpose of these bulletins is:

1. To provide a solid, non-conflicting approach for the repair of a fault in Commodore hardware.
2. To provide a mini training session for the repair of faulty equipment.
3. To reduce the number of telephone enquiries by your technicians on a particulare fault.
4. To make new Commcare technicians aware of how to diagnose and repair faults.
5. To provide Commcare Centres with a data-bank of information about faults and how to repair them.
6. To provide detailed information about diagnostic software.

The TSB (Technical Service Bulletin) attached details the repair of a C64 with no screen on power-up. It is understood that a summary would be written by the Commcare Centre about this particular approach to diagnose a faulty PLA. And so it should be as each technician in your organisation has different levels of repair experience. In the event of the technician needing further information at a later stage, he/she can refer to this document for that information. This explains why TSBs' are very comprehensive. They provide you with many facts.

Other TSBs' will be generated. They are not limited to repair of repair of Commodore equipment but also represent information on how to configure equipment. For example, the last update included how to install a 40 Mb hard drive into a PC40. Others will explain how to install a 3.5" disk drive into a PC, etc. This should assist you with configured machines that may come in for warranty service.

TECHNICAL SERVICE BULLETIN

No.SBC002-0

C64

NO SCREEN ON POWER-UP

(FAULTY PLA)

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Commodore Business Machines (Australia)

TECHNICAL SERVICE BULLETIN No. SBC002-0

No screen on power-up (faulty PLA) **25 May 1988**

This Service Bulletin contains the following sections:

SECTION 1 .... PURPOSE OF BULLETIN
SECTION 2 .... EQUIPMENT EFFECTED
SECTION 3 .... PARTS REQUIRED
SECTION 4 .... TOOLS REQUIRED
SECTION 5 .... SOFTWARE REQUIRED
SECTION 6 .... ESTIMATED TIME FOR REPAIR
SECTION 7 .... DIAGNOSTIC AND REPAIR PROCEDURE
SECTION 8 .... EQUIPMENT RE-CONSTRUCTION
SECTION 9 .... TESTING
SECTION 10 .... APPLICATION

Throughout this document the following alerts appear in the text:

DANGER:	This alert indicates that serious human injury or loss of life; serious and/or non-repairable damage to equipment may result, if the danger alert is not observed.
WARNING:	This alert indicates that damage or injury can occur to equipment if the details of the warning alert are not observed.
NOTE:	This alert is intended as a footnote. It is meant to draw attention to some aspect that might otherwise be overlooked.

Where text is included between two rows of asterisks, such text is to be considered as background information or as an explanation to text included in the document.

This document is issued by Commodore Business Machines (Australia) to competent technical staff involved in either the repair, maintenance, or configuration of Commodore equipment.

1.0 PURPOSE OF BULLETIN

This bulletin details a procedure to repair a Commodore 64 microcomputer with a blank screen caused by a faulty PLA.

For purposes of this document, a blank screen indicates a screen which is one having:

1. A dark blue border, with a light blue background, and no text or
2. A black screen on a television receiver

2.0 EQUIPMENT EFFECTED

This bulletin refers to any Commodore 64 microcomputer installed with an 82S100 version PLA, vendor number 906114-01.

3.0 PARTS REQUIRED

1 off PLA Commodore part number 931208

4.0 TOOLS REQUIRED

1 off Technicians toolkit
1 off Cathode Ray Oscilloscope (C.R.O.) or Logic Probe
1 off Multimeter - Analogue or Digital
1 off Power Supply
1 off Monitor
1 off Television set tuned to U.H.F. channel 36.

5.0 SOFTWARE REQUIRED

Refer to Section 9.0.

6.0 ESTIMATED TIME FOR REPAIR

Approximately 30 minutes.

7.0 DIAGNOSTIC AND REPAIR PROCEDURE

7.1 Remove the circuit board from the case.

7.2 Connect the video output of the C64 to a composite monitor with a standard Commodore Monitor cable. Connect the R.F. output of the C64 to a television receiver tuned to U.H.F. channel 36 with a standard Commodore R.F. cable.

7.3 Connect the circuit board to the power supply, switch on the C64 and observe the display.

7.4 Connection of test equipment.

1. Using a Cathode Ray Oscilloscope.:

   Connect the earth lead of the C.R.O. to the R.F. modulator case. Make sure not to short the case to any of the components inside the modulator.

2. Using a Logic Probe:

   Connect the earth lead of the probe to the R.F. modulator case. Make sure not to short the case to any of the components inside the modulator. Connect the 5V clip of the logic probe to a five volt supply line on the C64 circuit board. These can be found by measurement with a voltmeter. Five volts may be found on the front centre pin of the power switch, on the positive end of C100, or on the positive end of C53, depending on the revision of the board.

7.5 Switch off the C64. Remove the SID (6581) chip from the circuit board taking care not to damage the socket if fitted, and/or the circuit board.

The Commodore 64 system can function with the 6581 removed.

7.6 Switch on the C64 and examine both screens to verify the fault. The monitor will roll briefly when power is switched on. The T.V. will go blank.

7.7 Connect a probe to pin 6 of the PLA. This is the /CHAREN signal from the CPU. This signal will be high. It does not pulse. If the signal is low, disconnect the pin from the circuit after switching the C64 off. If the chip is socketed, remove it from the socket, bend the pin up, and re-insert the chip into its socket. If the chip is soldered, cut the pin and separate it from the IC. Do not remove the pin from the circuit board. It will be re-connected if the PLA is not faulty.

CAUTION: The pin should be cut at a distance of approximately 0.7mm from the body of the IC so that it can be re-connected, if needed, at a later stage.

Check the open circuit pin on the trace side of the break. If a low level signal is detected, re-connect the cut pin to the PLA and replace the CPU. If a TTL level high signal is detected, replace the PLA.

7.8 Apply the testing procedure as per sub-section 7.7 for pins 7, 8, 23, and 24 of the PLA. These pins are respectively /LORAM and /HIRAM from the CPU and /GAME and /EXROM from the expansion port. They will all have a high signal under normal operating conditions.

7.9 Place a probe on the character ROM at pin 20. A pulse should be displayed on the CRO or logic probe. If this signal in not present, disconnect the pin as described in sub-section 7.7

Switch the C64 on and check the open circuit track to the PLA again for the pulse signal. A faulty character ROM will be indicated if the signal is present. If the signal is not present then re-solder or re-insert the disconnected pin and replace the PLA.

7.10 Apply the same testing procedure as described in sub-section 7.7 to pin 20 of the BASIC and KERNAL ROMs.

In late model machines with the combined KERBASIC ROM, test pin 22. This pin is controlled via an OR gate driven from the two separate chip select lines from the PLA.

7.11 Check the TTL pulse level at pin 18 of the PLA. This is the /CASRAM line used to select the RAM. If the signal does not appear, disconnect pin 18 of the PLA from the circuit and observe the pulse on the now open circuit pin. If the signal does not appear, replace the PLA.

7.12 Observe pin 13 of the PLA. This is the GR/W line and it will pulse in synchrony with VIC memory access. If no signal is detected, disconnect pin 15 of the PLA from the circuit and observe the signal. Replace the PLA if the correct TTL pulse level is not displayed.

7.13 Test pin 12 of the PLA. This is the I/O line. This line selects the I/O chips. A correctly functioning PLA will display a TTL level pulse at this pin. Absence of this signal requires the pin to be cut. The pin must then be tested again at the body of the PLA. If no pulse is present, replace the PLA, otherwise re-connect the cut pin and replace the 74LS139 at location U17.

7.14 Observe pin 24 of the PLA. This is the R/W pin. This pin will pulse unless there is a faulty PLA, RAM or VIC chip. The signal appears at pin 3 of 4164 RAMs, pin 4 of 41464 RAMs, and pin 11 of the VIC chip. The PLA should be tested by disconnecting pin 24 from the circuit and monitoring the signal produced within the PLA. The pin may be re-connected if a TTL level pulse is detected.

8.0 EQUIPMENT RE-CONSTRUCTION

8.1 Turn off the power to the C64.

8.2 Re-insert the SID (6581) chip. Be sure you install the 6581 chip correctly and that all pins make correct contact in the socket.

8.3 Examine all ICs for disconnected pins and short circuits between re-soldered pins.

8.4 Switch on the power to the C64 and observe the screen to verify correct operation.

8.5 Switch off the C64 and disconnect all cables from the circuit board.

8.6 Install the board in its case and fasten with the screws removed earlier. Re-connect the keyboard and assemble the top and bottom halves of the case.

9.0 TESTING

9.1 Re-connect all cables and turn on the power to the C64 and verify correct operation.

9.2 Load and run any sound generating software. Alternatively enter the program presented below. It will generate a low frequency hum.

```
10 PRINT CHR$(147);"PRESS ANY KEY TO END"
20 POKE 54296,15
30 POKE 54296,0
40 GET A$:IF A$="" THEN 20

RUN
```

10.0 APPLICATION

This bulletin is issued to advise technical staff how to repair a CBM manufactured product.

The use and application of information contained herein is solely at the discretion of the person or persons to whom it is given.

All information contained herein is presented without incurring any responsibility by Commodore Business Machines, either for supplying components or for incorporating any modification in the equipment.

Commodore Business Machines will not be responsible for any damages or injuries incurred or sustained either directly or indirectly by the application of the information contained herein.

COMMODORE BUSINESS MACHINES
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LANE COVE NSW 2066

END